CHAPTER 14

EXAMPLES OF COST AND RETURN ESTIMATES:
UPPER MIDWEST DAIRY FARM

This chapter contains examples of cost and return (CAR) estimates for a Minnesota crop-livestock farm using the recommendations contained in this report. The same data was used in Chapter 13 to estimate the costs of production for the dairy enterprise on the farm.

UPPER MIDWEST DAIRY FARM

Farm Description

Ben Dairyman began farming with his father in 1974. He began buying into the business immediately and continued doing so as capital became available. By 1980 Ben and his wife, Bev, had taken over the operation of the business. On April 1,1980 they purchased the farm from Ben's parents. They had made a great deal of financial progress by the end of 1991. The data below were obtained from the summary of their farm records for 1991 and through a personal interview with Ben during early 1992.

The Dairyman family was composed of Ben and Bev, both 38 years old at the end of 1991, and 4 children. The children's ages were 5, 9, 12, and 14 at the close of 1991. Ben completed three years of a program leading to a bachelor's degree before returning to the farm. He was employed full time on the farm. Bev completed a B. A. in Liberal Arts. She had been employed off of the farm during the previous 17 years, with the exception of maternity leaves. She was working full time as an executive secretary for a firm in the local town (10 miles round trip) for an annual salary of $21,000. In addition, she helped with some of the office work and other overhead activities of the business.

Ben and Bev owned 356 acres of which 303 were cropped. In addition they paid cash rent to lease 55 acres and farmed another 47 acres under a crop-share arrangement. The number of acres of the crops they produced in 1991 are listed in Schedule 14.1. They produced a corn-soybean rotation on the better quality land. A rotation of corn, oats-alfalfa establishment, and three years of alfalfa production was produced on the remaining acreage. Cash rental rates in the area for the land suitable for the corn-soybean rotation were $85 per acre, while the rental for the lower quality land was $50. The landlord received one-third of the crop on the crop-shared land and did not share in the operating costs.

Ben participated in the feed grain program on the owned land. At the time these data were collected he planned to put an acreage equal to 5% of the corn base into the acreage reduction program (ARP) and collect the maximum deficiency payment during 1992. The rented land did not have a corn base.

Ben's dairy barn had space for 77 cows. The herd averaged 89 cows in 1991 (Schedule 14.2). In addition to milk and cull animals, he had been raising a few bulls from outstanding cows for sale as sires. The

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remaining bull calves were given to the full-time hired worker as nonmonetary compensation. The heifer calves were raised as herd replacements.

The operator's estimate of the labor use and the compensation paid during 1991 is given in Schedule 14.4. He expected it to be similar during 1992.

The buildings, improvements, machinery, and equipment at the close of 1991 are listed in Schedules 14.6 and 14.7. Many of these assets had been in use for a relatively long period. However, they were well maintained and very functional. In addition to the year of purchase and book value (remaining basis on the depreciation schedule), the operator provided estimates of the current market value and the years of useful life remaining.

Assumptions for Projected CARs

A projected CAR for the dairy herd on this farm is presented in Chapter 13. A brief version of the projected CAR is given in Table 13.2. A detailed CAR with related notes is presented in Table 13.3 and various appendix tables. Readers interested in a livestock example should refer to these tables.

The data sources and the assumptions made in preparing the 1992 projected CAR for corn and soybean are explained here. The machinery operations Ben planned to use during 1992 and the purchased inputs are listed in Schedules 14.5A, and 14.5B. The projected CAR are presented on an annual, per planted acre basis.

Gross Value of Production

The operator provided the average yield he expected to produce over the next five years. He assumed that any significant shortfall caused by hail, drought, flood, etc. would be made up for by crop insurance revenue. The expected production and revenue per acre is based on a projected yield of 130 bushels per acre. The owner has 151 acres of corn base on his own land. For corn, 0.05 of the base or 7.55 acres had to be placed in the acreage reduction program (ARP). The owner is eligible to receive deficiency payments on up to 85% of the corn base that is not placed in set-aside. Thus the deficiency payment applies to 80% of the corn base. The operator's ASCS program yield is 108 bushels per acre. The operator planned to plant 121 [(151)(0.80)] acres of corn on his owned land. Thus, the CAR for corn includes the cost and returns for 1 planted acre of corn and .0625 acres of ARP (7.55/121). The expected deficiency payment for 1992 was $0.48 per bushel. The actual average payment turned out to be $0.73 per bushel. The total expected deficiency payment is calculated as 151 ac x .80 x 108 bu x $.48 = $6,262.27. Dividing by 121 acres results in a deficiency payment of $51.75 per planted acre. The operator expected the cash price of corn on December 31, 1992 to be $2.15. This gives cash revenue of $279.50 per acre.

Fuel, Lube, and Repairs

The fuel, lube, and repair costs assume the power units are operated 10% longer than the time required for the operation. These three costs were calculated by multiplying the hours required for a given

operation by the cost per hour and then summing over the machines listed in Schedule 14.5A. The specific operations required for corn production along with the costs of the operations are listed in Table 14A.1. Data

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Table 14.1 A Sample One-page CAR Summary for a Corn Budget
1992 Projected Costs and Returns for Corn Per Planted Acre on Owned Land, Detailed
Ben & Bev Dairyman Farm, Upper Midwest, USA (See Chapter 14 for a complete description of the farm)
Prepared by John Q. Taskforce, Department of Agricultural Economics, Anonymous State University, March 1992

	Item	Units	Quantity	Price	Value
	Gross Value Of Production:				
1	Corn (a)	Bu	130.0000	2.150	279.50
2	Deficiency Payment (b)	A c	1.0000	51.750	51.75
3	Interest on Receipts to December (c)			0.092	0.00
4	Total Revenue (d)				331.25
	Operating Costs				
5	Seed (e)	000	28.0000	0.882	24.70
6	Anhydrous Ammonia (f)	cwt	1.2000	9.400	11.28
7	Dry Fertilizer 8-32-16 (g)	cwt	1.0000	8.950	8.95
8	Zinc (g)	lb	1.0000	0.320	0.32
9	Extrazine (h)	lb	2.2000	3.790	8.34
10	2-4-D & Custom Application (i)	A c	1.0000	7.250	7.25
11	ARP Seed (j)	Bu	0.1000	3.000	0.30
12	Crop Insurance (k)	A c	1.0000	4.450	4.45
13	Anhydrous Applicator Rental (f)	A c	1.0000	0.500	0.50
14	Fuel & Lube (l)				6.60
15	Repairs (m)				5.40
16	Interest on Oper. Inputs to Dec (n)				4.55
17	Interest on Fuel & Lube to Dec (o)				0.22
18	Interest on Repairs to Dec (p)				0.17
19	Total Operating Costs (d)				83.02
	Allocated Overhead				
20	Hired Labor 1(q)	HR			9.41
21	Hired Labor 2(q)	HR			0.45
22	Opportunity Cost of Operator Labor (r)	HR			1.71
23	Opportunity Cost of Son's Labor (r)	HR			0.00
24	Total Implicit Interest on Labor (s)				0.38
25	Total Labor cost (s)				11.95
26	Capital Recovery of Mach & Eq Inv(t)				42.15
27	Opportunity Cost of Land (u)	A c	1.0625	85.000	90.31
28	Insurance (v)				0.00
29	General Farm Overhead (w)				9.73
30	Total Allocated Overhead (d)				166.09
31	Total Costs Listed (d)				249.11
32	Value Of Prod. Less Total Oper. Costs (d)				248.23
33	Value Of Prod. Less Total Costs Listed (d)				82.14

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and assumptions used to estimate machinery costs are listed in Table 14A.2. The costs of operating various tractors and implements are contained in Table 14A.3, while the costs of performing various operations using tractors and implements are contained in Table 14A.4. The fuel consumption and repairs are estimated using list prices for machinery and horsepower given in Schedule 14.7 and the repair equations presented in Chapter 5 of this publication. All of the power units have a diesel engine. The price of diesel fuel delivered to the farm on January 1, 1992 is $0.90 per gallon.

Interest

Interest on operating inputs is based on cash costs and is calculated monthly until December 31 at an annual rate of 9.2%. This is based on a risk-free rate of 3%, a risk premium of 2% and an expected inflation rate of 4%. The risky real rate is then 5%. The monthly nominal interest rate is 0.7361% while the monthly inflation rate is 0.3274%.

Labor

The amounts of labor per cow in the projected CARs prepared in Chapter 13 were based on the hours used during 1991 as shown in Schedule 14.4. The amounts of labor for the crop enterprises by month are estimated using engineering equations for machinery with adjustments for downtime, fueling, travel, etc. The rates paid to hired workers during 1991 (Schedule 14.4) are adjusted forward to reflect inflation and used as the hired wage rates in the 1992 projections. The 1991 values are $9.47 per hour for worker 1 and $5.43 per hour for worker 2. The 1992 nominal averages are $9.845 per hour for hired worker 1 and $5.645 per hour for hired worker 2. The opportunity cost of unpaid labor for the operator was assumed to be $9.50 per hour in 1991. The wage rate of the second hired worker ($5.43 per hour) was used as an estimate of the opportunity cost of the son's labor in 1991. These 1991 wage rates were adjusted for inflation in 1992 giving 1992 nominal averages of $9.88 and $5.645 per hour. The allocation of tasks to the various labor types was based on history and Ben's best guess of who would likely perform the various operations. For example, Ben planned to plant and spray, but leave most other tasks to the hired help.

Capital Recovery

Capital recovery is based on the difference between the 1992 replacement purchase cost and the estimated salvage value at the end of the useful life using either the Cross-Perry (1995, 1996) or the ASAE remaining value equations. The capital recovery cost is computed using a real annuity that is then adjusted for inflation of 4% in the current period.

Other Overhead Costs

The general farm overhead costs are based on the allocations in Schedule 14.8 and the production of 154 acres of corn, 27 acres of corn silage, 30 acres of oats-alfalfa establishment, 83 acres of alfalfa, 102 acres of soybeans, and 7.55 acres of ARP. The insurance cost listed in Schedule 14.8 is insurance on the machinery and equipment. This cost is not allocated to the various enterprises in the projected CAR based on 1991 data but is computed directly in estimating machinery costs. The other overhead costs are allocated to the various crops based on the percentages in Schedule 14.8. The opportunity cost of land is the rental rate

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for the quality of land being used. Thus, neither the real estate taxes nor the interest on the real estate loan are allocated to the projected CAR for crops.

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Table 14.2 A Sample Detailed CAR Summary for a Corn Budget
1992 Projected Costs and Returns for Corn Per Planted Acre on Owned Land, Detailed
Ben & Bev Dairyman Farm, Upper Midwest, USA (See Chapter 14 for a complete description of the farm)
Prepared by John Q. Taskforce, Department of Agricultural Economics, Anonymous State University, March 1992

	Item	Units	Quantity	Price	Month of Revenue/Expense	Value	Implicit interest
	Gross Value Of Production:						
1	Corn (a)	Bu	130.00	2.150	12	279.50	0.000
2	Deficiency Payment (b)	Ac	1.00	51.750	12	51.75	0.000
3	Interest on Receipts to December (c)			0.092		0.00	
4	Total Revenue (d)					331.25	
	Operating Costs						
5	Seed (e)	000	28.00	0.882	2	24.70	1.879
6	Anhydrous Ammonia (f)	cwt	1.20	9.400	-2	11.28	1.220
7	Dry Fertilizer 8-32-16 (g)	cwt	1.00	8.950	5	8.95	0.471
8	Zinc (g)	lb	1.00	0.320	5	0.32	0.017
9	Extrazine (h)	lb	2.20	3.790	5	8.34	0.439
10	2-4-D & Custom Application (i)	Ac	1.00	7.250	8	7.25	0.216
11	ARP Seed (j)	Bu	0.10	3.000	5	0.30	0.016
12	Crop Insurance (k)	Ac	1.00	4.450	5	4.45	0.234
13	Anhydrous Applicator Rental (f)	Ac	1.00	0.500	-2	0.50	0.054
14	Fuel & Lube (l)					6.60	0.222
15	Repairs (m)					5.40	
16	Interest on Oper. Inputs to Dec (n)					4.55	
17	Interest on Fuel & Lube to Dec (o)					0.22	
18	Interest on Repairs to Dec (p)					0.17	
19	Total Operating Costs (d)					83.02	
	Allocated Overhead						
20	Hired Labor 1(q)	HR	0.9510			9.41	
21	Hired Labor 2(q)	HR	0.0794			0.45	
22	Opportunity Cost of Operator Labor (r)	HR	0.1740			1.71	
23	Opportunity Cost of Son's Labor (r)	HR	0.0000				
24	Total Implicit Interest on Labor (s)					0.38	
25	Total Labor cost (s)					11.95	
26	Capital Recovery of Mach & Eq Inv(t)					42.15	
27	Opportunity Cost of Land (u)	Ac	1.0625	85.000		90.31	
28	Insurance (v)					0.00	
29	General Farm Overhead (w)					9.73	
30	Total Allocated Overhead (d)					166.09	
31	Total Costs Listed (d)					249.11	
32	Value Of Prod. Less Total Oper. Costs (d)					248.23	
33	Value Of Prod. Less Total Costs Listed (d)					82.14	

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TABLE 14.2   1992 Projected Costs and Returns for Corn Per Planted Acre on Owned Land, Detailed Notes

[a]   The corn is priced in December at $2.15 per bushel. The expected yield is 130 bushels per acre. This gives revenue of $279.5 [(2.15)(130)]. Because the revenue occurs at the end of the year, no interest accrues on receipts.

[b]   The total expected deficiency payment is calculated as 151 ac. x 0.80 x 108 bu. x $0.48 where $0.48 is the expected deficiency payment per bushel. Dividing by 121 results in a deficiency payment of $51.75 per planted acre. This payment will actually accrue over an 18-month period but for the sake of simplicity in preparing this estimate, it was assumed that the entire payment occurred on December 31, 1992.

[c]   Because all revenue payments were assumed to be received on December 31, 1992, there is no implicit interest on revenue. This line is the total of the implicit interest column in rows 1-2 of the table.

[d]   Totals may not add due to rounding.

[e]   Seed was planted at a rate of 28,000 kernels per acre. The price per 1,000 kernels was projected to be $0.882 for a total cost per acre of $24.70. Seed was purchased in February though it was not planted until May. The implicit interest was computed from February 28 until the end of the year. This gives an interest cost of

$$
\begin{aligned}
ic \ ' \ & R(1\% \ i)^{\frac{n}{12}} \ \& \ R \\
' \ & (24.70)(1.092)^{\frac{10}{12}} \ \& \ 24.70 \\
' \ & 1.879 \ .
\end{aligned}
$$

[f]   Anhydrous ammonia is applied in the November prior to planting. The operator uses his own tractor to apply the fertilizer but rents an applicator from the local cooperative. The cost of the applicator rental is included in line 13 and is $0.50 per acre. The cost of the use of the tractor is included in the lines on repair and capital recovery. Interest is charged for 14 months.

[g]   Dry fertilizer (8-32-16) and zinc are applied at the time of planting (May) using an applicator attached to the corn planter.

[h]   Extrazine (a corn herbicide) is applied in May using the operator's sprayer. Machinery and labor costs for spraying are included in lines 14, 15, 22, 24, and 26.

[i]   2-4 D was applied aerially in August. The cost listed includes the chemical and the custom aerial application.

TABLE 14.2   Detailed Notes (continued)

[j]   Grass was planted on the acreage reduction program (ARP) acres (7.55) in May. The cost of the seed is listed in line 11, while the cost of labor and machinery are included in lines below.

[k]   Crop insurance was $4.45 per acre. It assumed that the premiums are due in May.

[l]   Fuel and lubrication was computed using the engineering equations presented in Chapter 5. The cost of diesel is assumed to $0.90 per gallon. For a diesel tractor with 140 horsepower (HP) the consumption of fuel per hour is given by

$$
\begin{aligned}
Diesel_{gph} &= (.06) \ (PTO_{max}) \ (.73) \\
&= (.06) \ (140) \ (0.73) \\
&= 6.132
\end{aligned}
$$

where PTO_{max} is the maximum PTO horsepower per hour. Fuel cost is obtained by multiplying the hours of operation required for each operation by the cost of fuel per hour and fuel consumption per hour and then summing over the machine operations. For example, the cost of fuel per hour for the 140 HP tractor is $5.5188 [(0.9)(6.132)]. Lubrication is assumed to be 15% of fuel costs or $0.8278. Total fuel and lube cost is then $6.34662 per hour. As an example consider the fuel and lubrication costs of planting corn. The cost per hour for the tractor is divided by the field capacity of the planter to get a cost per acre. This gives a cost per acre of $\dfrac{6.34662}{8.6\overline{6}} = \$0.73225$. It is assumed in computing fuel and lubrication costs that the power unit operates 10% longer than the time required to complete the field operation. This cost per acre is thus multiplied by 1.1 to obtain a cost using January 1 prices of $0.8055 which is the cost reported for corn planting in Table 14A.4. This is then adjusted to the end of May using the inflation rate of 4%. Thus the cost per acre for planting corn of $0.8055 in January is adjusted to be $0.8188 [(1.04)$^{5/12}$ (0.8055)] as of the end of May. This is the fuel and lube cost reported in Table 14A.1. These nominal monthly costs for all operations are then summed to get the total in line 14 of $6.60. This total is also reported in Table 14A.1.

Interest is charged on each operating expense from the end of the month of occurrence to the end of the year. For planting fuel and lube it is charged from May 31 until the end of the year at a rate of 9.2%. This will give

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$$ic \; ' \; (0.8188)(1.092)^{\frac{7}{12}} \; \& \; 0.8188$$
$$' \; 0.043 \, .$$

Detailed information on the costs of all the machinery is contained in Table 14A.4.

TABLE 14.2   Detailed Notes (continued)

[m]   Repair costs for each machine are estimated using the appropriate repair cost equations given in Chapter 5. Total repair costs are obtained by summing costs over the operations listed in Schedule 5a. Repair costs assume the power unit operates 10% longer than the time required to complete the operation just as with fuel and lubrication. For example consider the 140 HP tractor with a nominal purchase price at the beginning of 1992 of $53,610 and list price of $58,971. Total repairs over the 20-year lifetime of the tractor evaluated in end of 1992 dollars are given by

$$C_{rm}(140 HP\, new\, tractor) \,\, ' \,\, (.007)(58,971)(1.04)\left(\frac{6,000}{1,000}\right)^{2.0} \,\, ' \,\, \$15,455.1197 \,.$$

The list price is adjusted by the 4% inflation rate. The life of the tractor is 6,000 [(300 hours/year)(20 years)] hours. Dividing the total cost by 6,000 hours gives a per hour cost of $2.5758. Also consider the corn planter with a useful life of 15 years and annual use of 75 hours per year. The total repair cost is

$$C_{rm}(planter) \,\, ' \,\, (.32)(18,095)(1.04)\left(\frac{1,125}{1,000}\right)^{2.1} \,\, ' \,\, \$7,711.91$$

in end-of-year dollars. The cost per hour is $6.855 [(7,711.91)/(1,125)]. So the total cost per hour of machine time in planting corn is $9.4608 [(2.5758)+(6.8550)]. Since we assume that the tractor operates 10% more hours than the actual planting time, the cost per hour for the operation is $9.688 [(2.5758)(1.1)+(6.8550)]. The field capacity of the corn planter is 8 2/3 acres per hour. This gives a per acre cost of $1.1179. This is also reported in Table 14A.4. This is an end-of-year value. In Table 14A.1, this value is reported in the Plant Corn column in the Repair Cost per Acre (End-of-Year Prices) row. The convention we adopt for interest on repair expenses is to compute nominal interest on the year-end repair value rather than attempting to adjust repair cost to the month of operation. Thus the repair interest on planting corn is given by

$$ic \,\, ' \,\, (1.1179)(1.092)^{\frac{7}{12}} \,\, \& \,\, 1.1179$$
$$\quad ' \,\, 0.05889 \,.$$

Also consider the repair costs for the row cultivation operation which uses the used 140 HP tractor. This tractor was purchased in 1987 for a nominal cost of $26,419. The tractor had 1,250 hours of use at the time of purchase. Ben Dairyman used the tractor 300 hours per year for the years 1987-91. The accumulated hours are 2,750 [1,250 + (300)(5)]. The tractor has total useful life of 20 years. Repair expenses are computed on the list price of a new tractor. Since this tractor is similar to the other 140 HP tractor, we can use the same list price to compute repair expenses. First we compute the cumulated expenses for the first 2,750 hours of use. This will give

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TABLE 14.2   Detailed Notes (continued)

$$C_{rm}(140 HP \, used \, tractor, 2,750 \, hrs) \quad ' \quad (.007)(58,971)(1.04)\left(\frac{2,750}{1,000}\right)^{2.0} \quad ' \quad \$3,246.6484 \, .$$

Then we compute the repair expenses for the total lifetime use of 5,750 hours [2,750 + (10)(300)]. This gives

$$C_{rm}(140 HP \, used \, tractor, 5,750 \, hrs) \quad ' \quad (.007)(58,971)(1.04)\left(\frac{5,750}{1,000}\right)^{2.0} \quad ' \quad \$14,194.0248 \, .$$

The repair expenses that are included in the cost estimation are given by the difference or 14,194.0248 - 3,246.6484 = \$10,947.3764. The cost per hour is then \$3.649 [10,947.3764/3,000]. Notice that is quite a bit higher than the cost of the new 140 HP tractor (\$2.58) since the used tractor is in the high repair cost range of its life. Now consider the repair costs for the row cultivator. This has a useful life of 15 years and annual use of 30 hours per year. The list price is \$10,615. The total repair cost is

$$C_{rm}(row \, cultivator) \quad ' \quad (.17)(10,615)(1.04)\left(\frac{450}{1,000}\right)^{2.2} \quad ' \quad \$323.9429$$

in end-of-year dollars. The cost per hour is \$0.7199 [(323.9429)/(450)]. So the total cost per hour of machine time in row cultivating is \$4.73 [(3.649)(1.1)+(0.7199)]. The field capacity of the row cultivator is 17.45 acres per hour. This gives a per acre cost of \$0.27. This is also reported in Table 14A.4. This is an end-of-year value. In Table 14A.1, this value is reported in the Row Cultivate column in the Repair Cost per Acre (End-of-Year Prices) row. Total repair costs are given by adding up the costs for each operation needed to grow corn. The total from Table 14A.1 is \$5.39688. Interest on this expense is also given in Table 14A.1 and is \$0.17.

[n]   All input costs are assumed to occur on the last day of the month. Interest is compounded at a nominal monthly rate of 0.7361%. Real interest accrues at a monthly rate of 0.4074% while inflation occurs at a monthly rate of 0.32737%. An expense in January accrues interest for 11 months while an expense in May accrues interest for 7 months. The cost in this line is the sum of the implicit interest costs in the last column of the Table 14.2 for lines 5-13.

[o]   Interest on fuel and lube comes from Table 14A.1. This comes from paying interest at a nominal rate for the appropriate number of months on the expense for each operation from the month of operation until December 31st. For row cultivating this gives an interest on fuel and lube expense of

$$ic \quad ' \quad (0.40789)(1.092)^{\frac{6}{12}} \quad \& \quad 0.40789$$
$$' \quad 0.01835 \, .$$

TABLE 14.2   Detailed Notes (continued)

Adding these interest expenses up over all the operations gives the total interest charges of $0.22235.

[p]   Interest on repairs comes from Table 14A.1. This comes from paying interest at a nominal rate for the appropriate number of months on the expense for each operation from the month of operation until December 31st. For row cultivation this gives an interest on repair expense of

$$ic = (0.27121)(1.092)^{\frac{6}{12}} \& 0.27121$$
$$= 0.0122 .$$

Adding these interest expenses up over all the operations gives the total interest charges of $0.1706.

[q]   Labor for corn production is based on the machine operations performed adjusted by a labor multiplier. We have data on the nominal (opportunity) cost for each type of labor for 1991. For the operator this is assumed to be $9.50 per hour. For the hired worker this is computed in Schedule 14.4. Total compensation for the first hired worker was $24,140. Dividing by the number of hours worked gives an average nominal wage of $9.466 [24,140/2,550]. This is adjusted to an average 1992 nominal wage of $9.845 [(9.466)(1.04)]. For the second hired worker compensation was equal to $4,885. This gives an implied nominal wage of $5.4277 [4,885/900]. The nominal value for 1992 is $5.645. This is a nominal average for the year. As in Chapter 13, we may want to create a nominal set of prices for each month that have this average. The easiest way to do this is using the procedure suggested in Chapter 2. What is wanted then is a real (and also nominal given the base period convention) price at the end of the year that when converted to monthly nominal prices has a simple average equal to the reported nominal average. Let $\bar{p}^n$ be the average nominal price for the year, p_j^n the nominal price in the jth month and p_m the monthly rate of inflation. We can then find the real (nominal) price at the end of the year (p^r) as follows

TABLE 14.2   Detailed Notes (continued)

$$\bar{p}^{\,n} = \frac{\displaystyle\sum_{j=1}^{12} p_j^{\,n}}{12}$$

$$p_j^{\,n} = p^{\,r}(1+p_m)^{j-12}$$

$$\bar{p}^{\,n} = \frac{\displaystyle\sum_{j=1}^{12} p^{\,r}(1+p_m)^{j-12}}{12}$$

$$p^{\,r} = \frac{(12)(\bar{p}^{\,n})}{\displaystyle\sum_{j=1}^{12}(1+p_m)^{j-12}}$$

$$= \frac{(12)(\bar{p}^{\,n})}{(1+p_m)\displaystyle\sum_{j=1}^{12}(1+p_m)^{(j-12-1)}}$$

$$= \frac{(12)(\bar{p}^{\,n})}{(1+p_m)\,US_0(p_m,12)}$$

$$= \frac{(12)(\bar{p}^{\,n})}{(1+p_m)\left(\dfrac{1-(1+p_m)^{-12}}{p_m}\right)}$$

where the last equalities comes from equations 2B.7 and 2B.8 in Appendix 2B where p replaces i in the summation. Writing the expression this way allows the use of canned annuity procedures for computing p^r. The nominal price for each month is then computed as

$$p_j^{\,n} = p^{\,r}(1+p_m)^{j-12}$$

where $p_{12}^{\,n} = p_r$. Consider, for example, the average nominal price for operator labor for 1992 of $9.88. The real price of the year, which is also the nominal price for the end of December, is given by

TABLE 14.2   Detailed Notes (continued)

$$p^r = \frac{(12)(\bar{p}^n)}{(1\% p_m)\left(\dfrac{1 \& (1\% p_m)^{\&12}}{p_m}\right)}$$

$$= \frac{(12)(9.88)}{(1\% 0.003274)\left(\dfrac{1 \& (1\% 0.003274)^{\&12}}{0.003274}\right)}$$

$$= \frac{118.56}{(1.003274)\left(\dfrac{1 \& 0.961535}{0.003274}\right)}$$

$$= \frac{118.56}{(1.003274)(11.74848)}$$

$$= 10.0586.$$

The nominal price for a given month is given using the standard nominal adjustment. For example, the cost of operator labor at the end of July is given by

$$p_7^n = 10.0586(1.003274)^{\&5}$$
$$= 10.0586(0.98379)$$
$$= 9.8955.$$

The real year-end values for the two hired workers and implicitly the operator's son are given in the last section of Table 14A.7. The real year-end wages are as follows:

Operator	$10.05857
Hired Worker 1	$10.02328
Hired Worker 2	$ 5.74691

Table 14A.7 also reports a nominal wage for each month. The procedure used in estimating labor costs for corn production was to compute the total hours used by a given operation and then multiply it by the year-end real wage. This is then adjusted to a nominal labor cost for the month of interest. Consider the operation of row cultivation performed by the lower cost hired worker. The cost per acre is given by multiplying the cost per hour for the worker by the field multiplier (1.2 hours/acre) and then dividing by the field capacity of the row cultivator. This will give

$$C_{labor}(row\,cultivator, real) = \left(\frac{(5.7469)(1.2)}{17.45}\right) = 0.395.$$

Chapter 14. Examples of Cost and Return Estimates: Upper Midwest Dairy Farm

TABLE 14.2   Detailed Notes (continued)

This can then be adjusted to the end of June using the monthly nominal inflation rate. This will give

$$C_{labor}(row\,cultivator,\,June\,cost) \quad' \quad (0.3951)(1.003274)^{\&6}$$
$$' \quad (0.395)(0.980579)$$
$$' \quad 0.3874\,.$$

These costs are then added up across operations to get the total labor cost for each type of labor. The cost of hired labor of the first type is \$9.4145 while the cost of labor of the second type is \$0.448.

[r]   The cost of operator labor is computed in a fashion similar to hired labor. The average nominal opportunity cost of the operator's labor in 1992 was projected to be \$9.88. The real year-end cost was projected to be \$10.05857. Consider the labor cost of planting corn. The field capacity of the planter is 8 2/3. This gives a real year-end cost per acre of

$$C_{labor}(corn\,planting,\,real) \quad' \quad \left(\frac{(10.05857)(1.2)}{8.6\overline{6}} \right) \quad' \quad 1.3927\,.$$

The cost in May is given by

$$C_{labor}(corn\,planting,\,May\,cost) \quad' \quad (1.3927)(1.003274)^{\&7}$$
$$' \quad (1.3927)(0.97738)$$
$$' \quad 1.3612\,.$$

Total operator labor costs are \$1.71.

[s]   Interest is charged on each labor expense at a monthly nominal rate from the month of the expense to December 31st. Consider the interest charge on the labor for planting corn. This expense will accrue interest for 7 months. The expense is given by

$$ic \quad' \quad (1.3612)(1.092)^{\frac{7}{12}} \quad \& \quad 1.3612$$
$$' \quad 0.0717\,.$$

Total interest expenses for labor are obtained by aggregating the expenses over operations and labor types. The total is \$0.3774.

TABLE 14.2   Detailed Notes (continued)

[t] Capital recovery is based on the difference between the beginning value (list price) of the various pieces of equipment and their real salvage value at the end of their useful life. This salvage value is discounted back to the present at a real interest rate of 5% and then subtracted from the initial value to obtain a net present cost of the equipment. This is then converted to a real annual annuity following the procedures outlined in Chapter 2 and equation 6.7.

Salvage values for each machine are computed using the formulas from Chapter 6. Where there is a clear match between the particular machine and the categories of Cross and Perry (1995, 96), their remaining value equations are used. When there is not a close match, the older ASAE remaining value equations are used. Such mixing of estimates is probably not a good idea, but is used here to illustrate a method that can be used when better estimates of remaining value are not available. Consider the computation of the remaining value for the 140 HP tractor used by Ben and Bev. The nominal list price at the beginning of 1992 is $58,971 (Schedule 14.7). The projected useful life is 20 years with annual use of 300 hours per year. We compute the salvage value in the same dollars as the initial list price. We then adjust for inflation after computing the capital recovery cost. Using the equation from Table 6.3 we get an estimated remaining value of

$$rv(140\,HP\,tractor,real)_{C\&P} = (58,971)(0.97690 - (0.02301)(20)^{0.76} - (0.0012)(300)^{0.6})^{3.85}$$

$$= 16,286.248 \,.$$

Notice that the salvage value of the used 140 HP tractor is slightly higher at $16,368 because it is used less hours over its lifetime given annual use of only 250 hours per year by the previous owner.

The capital service cost of the tractor is computed using equation 6.7. The purchase price, not the list price, is used in the calculation.

$$CSC_{140\,HP\,tractor} = \frac{\left(PP - \dfrac{SV}{(1+r)^n}\right)}{\left(\dfrac{1 - (1+r)^{-n}}{r}\right)} = \frac{\left(53,610 - \dfrac{16,286.25}{(1.05)^{20}}\right)}{\left(\dfrac{1 - (1.05)^{-20}}{.05}\right)}$$

$$= \frac{47,471.8836}{12.46221} = 3,809.266 \,.$$

Because this is beginning-of-year value it is multiplied by (1.04) to obtain a year-end value of $3,961.6364. This is the value reported in Table 14A.2 in the Perry-Cross (P-C) capital recovery column. Taxes, insurance, and shelter (TIS) are charged at 2% of the average of purchase price and salvage value. This gives

TABLE 14.2   Detailed Notes (continued)

$$TIS_{140\ HP\ tractor} \ ' \ \left(\frac{PP \ \% \ SV}{2} \right) (0.02) \ ' \ \frac{53,610 \ \% \ 16,286.25}{2} (0.02)$$

$$' \ (34,948.125)(0.02) \ ' \ 698.9625 \ .$$

Multiplying by 1.04 will give (698.9625)(1.04) = \$726.92. The sum of this and the capital recovery will give the total overhead cost for the tractor. This yields 726.92 + 3,961.636 = \$4,688.56. Dividing this by 300 hours of annual use will give \$15.63 per hour for overhead. This is the figure reported in Table 14A.3.

We can perform a similar operation for the row cultivator. The nominal list price of a new like cultivator at the beginning of 1992 from Table 14A.2 is \$10,615. The projected useful life is 15 years with annual use of 30 hours per year. We compute the salvage value in the same dollars as the initial list price. We then adjust for inflation after computing the capital recovery cost. Using the equation from Table 6.2 we get an estimated remaining value of

$$rv(140\ HP\ tractor, real)_{ASAE} \ ' \ (10,615)(0.60)(0.885)^{15}$$

$$' \ 1,019.11 \ .$$

The capital service cost of the cultivator is given by

$$CSC_{row\ cultivator} \ ' \ \frac{\left(PP \ \& \ \dfrac{SV}{(1\%r)^n} \right)}{\left(\dfrac{1 \ \& \ (1\%r)^{\&n}}{r} \right)} \ ' \ \frac{\left(9,650 \ \& \ \dfrac{1,019.11}{(1.05)^{15}} \right)}{\left(\dfrac{1 \ \& \ (1.05)^{\&15}}{.05} \right)}$$

$$' \ \frac{9,159.7907}{10.3796} \ ' \ 882.48 \ .$$

Because this is beginning-of-year value it is multiplied by (1.04) to obtain a year-end value of \$917.78. This is the value reported in Table 14A.2 in the Cross-Perry (C-P) capital recovery column. Taxes, insurance, and shelter (TIS) are charged at 2% of the average of purchase price and salvage value. This gives

$$TIS_{140 \; HP \; tractor} \; ' \; \left(\frac{PP \; \% \; SV}{2} \right)(0.02) \; ' \; \frac{9,650 \; \% \; 1,019.1}{2}(0.02)$$
$$' \; (5,334.55)(0.02) \; ' \; 106.69 \; .$$

TABLE 14.2   Detailed Notes (continued)

Multiplying by 1.04 will give (106.69)(1.04) = $110.96. The sum of this and the capital recovery will give the total overhead cost for the cultivator. This yields $1,028.74. Dividing this by 30 hours of annual use will give $34.29 per hour for overhead. This is the figure reported in Table 14A.3. Detailed calculations for both 140 HP tractors and the row cultivator are contained in Table 14A.6.

Table 14A.3 gives overhead costs per year and per hour for all the machines owned and used by Ben and Bev. Ben planned to sell the first 90 HP tractor early in 1992 and use the newer 90 HP tractor as a replacement. Therefore, the second 90 HP tractor was used on computing all costs of production.

Per acre overhead costs are computed in a manner similar to repair costs. Consider the activity of row cultivation using the row cultivator and the used 140 HP tractor. The overhead cost per hour of the tractor is $12.40 while that of the cultivator is $34.49. Since we assume that the tractor operates 10% more hours than the actual planting time, the cost per hour for the operation is $47.93 [(12.40)(1.1)+(34.29)]. The field capacity of the cultivator is 17.45 acres per hour. This gives a per acre cost of $2.74. This is also reported in Table 14A.4. This is an end-of-year value. In Table 14A.1, this value is reported in the Row Cultivate column in the Overhead Costs per Acre (End of Year) row. The sum of these expenses for all operations is in the last column of Table 14A.1 and is the Capital Recovery of Machinery & Equipment Inventory cost reported in Table 14.2. The total is $42.1516.

[u]   The cash rental rate for the quality of land is $85 per acre. Each acre of corn requires 1 acre for corn plus .0625 acre for the ARP. This gives a total cost of $90.3125 [(1.0625)(85)]. It is assumed that this is all paid at the end of the year or alternatively that the $85 per acre cash rent is in year-end dollars.

[v]   Insurance on machinery and equipment for 1991 is included in Table 14A.8. This could be allocated for 1992 using the 1991 data and a 4% inflation rate. For corn for grain this would give an allocation of $0.6537 [(880)(1.04)(0.11) ÷ 154]. But because insurance was already calculated in footnote [t], no entry is made in line 28 of the estimate.

[w] General farm overhead includes the corn enterprise's share of office expense, the farm overhead portion of fuel, lube, and utilities and the farm overhead portion of maintenance and repairs. Using the data in Schedule 14.8 these costs total ($1,194 + 3,500 + 7,165 + 1,235) $13,094. The enterprise share for corn is $1,440.34 or $9.3528 per acre. Adjusting for 4% inflation gives $9.73. Complete data is in Table 14A.8.

Chapter 14. Examples of Cost and Return Estimates: Upper Midwest Dairy Farm

Table 14.3 A Sample Detailed CAR Summary for a Soybean Budget
1992 Projected Costs and Returns for Soybean Per Planted Acre on Owned Land, Detailed

Ben & Bev Dairyman Farm, Upper Midwest, USA (See Chapter 14 for a complete description of the farm)

Prepared by John Q. Taskforce, Department of Agricultural Economics, Anonymous State University, March 1992

	Item	Units	Quantity	Price	Month of Revenue/Expense	Value	Implicit interest
	Gross Value Of Production:						
1	Soybean (a)	Bu	40.00	5.500	12	220.00	0.000
2	Interest on Receipts to December (b)			0.092		0.00	
3	Total Revenue (c)					220.00	
	Operating Costs						
4	Seed (d)	lb	70.00	0.142	2	9.94	0.756
5	Pursuit (e)	Ac	1.00	13.2	6	13.20	0.594
6	Crop Insurance (f)	Ac	1.00	3.94	6	3.94	0.177
7	Labor to walk crop (g)	HR	0.40	6	7	2.40	0.090
8	Fuel & Lube (h)					4.41	0.129
9	Repairs (i)					3.89	
10	Interest on Oper. Inputs to Dec (j)					1.62	
11	Interest on Fuel & Lube to Dec (k)					0.13	
12	Interest on Repairs to Dec (l)					0.12	
13	Total Operating Costs (c)					39.64	
	Allocated Overhead						
14	Hired Labor 1(m)	HR	0.5121			5.09	
15	Hired Labor 2(m)	HR	0.0688			0.39	
16	Opportunity Cost of Operator Labor (n)	HR	0.1740			1.71	
17	Opportunity Cost of Son's Labor (n)	HR	0.0000				
18	Total Implicit Interest on Labor (o)					0.21	
19	Total Labor cost (p)					7.39	
20	Capital Recovery of Mach & Eq Inv(q)					49.28	
21	Opportunity Cost of Land (r)	Ac	1.0000	85.000		85.00	
22	Insurance (s)					0.00	
23	General Farm Overhead (t)					10.68	
24	Total Allocated Overhead (c)					159.75	
25	Total Costs Listed (c)					199.39	
26	Value Of Prod. Less Total Oper. Costs (c)					180.36	
27	Value Of Prod. Less Total Costs Listed (c)					20.61	

Chapter 14. Examples of Cost and Return Estimates: Upper Midwest Dairy Farm

TABLE 14.3   1992 Projected Costs and Returns for Soybeans Per Planted Acre on Owned Land, Detailed Notes

[a]   Ben's best estimate of the soybean price in December is $5.50 per bushel. The expected yield is 40 bushels per acre. This gives revenue of $220.00 [(5.50)(40)]. Because the revenue occurs at the end of the year, no interest accrues on receipts.

[b]   Because all revenue payments were assumed to be received on December 31, 1992, there is no implicit interest on revenue. This line is the total of the implicit interest column in row 1 of the table.

[c]   Totals may not add due to rounding.

[d]   Seed was planted at a rate of 70 lbs per acre. The price per lbs was projected to be $0.142 for a total cost per acre of $9.94. Seed was purchased in February though it was not planted until May. The implicit interest was computed from February 28 until the end of the year.

[e]   A herbicide (Pursuit) was applied in June. The cost of the herbicide is $13.20 per acre. The operator uses his own tractor and sprayer to apply the herbicide. The cost of the use of the tractor and sprayer is included in the lines on repair and capital recovery.

[f]   Crop insurance was $3.94 per acre. It assumed that the premiums are due in June.

[g]   The operator hired additional labor to walk the soybean crop in July. He paid $6.00 per hour for the labor. An acre took 0.4 hours of labor for a cost per acre of $2.40.

[h]   Fuel and lubrication was computed using the engineering equations presented in Chapter 5. For a more complete discussion see note [l] to Table 14.2. The fuel and lube cost is $4.41 and is reported in Table 14A.9 in the row labeled Fuel and Lube Cost per Acre (Current Month Prices) and the total column.

[i]   Repair costs for each machine are estimated using the appropriate repair cost equations given in Chapter 5. Total repair costs are obtained by summing costs over the operations listed in Schedule 5b. Repair costs assume the power unit operates 10% longer than the time required to complete the operation just as with fuel and lubrication. More detail is contained in note [m] in Table 14.2. Total repair costs are given by adding up the costs for each operation needed to grow soybeans. The total from the row labeled Repair Cost per Acre (End-of-Year Prices) in Table 14A.9 is $3.89.

[j]   All input costs are assumed to occur on the last day of the month. Interest is compounded at a nominal monthly rate of 0.7361%. Real interest accrues at a monthly rate of 0.4074% while inflation occurs at a monthly rate of 0.32737%. An expense in January accrues interest for 11 months while an expense in May accrues interest for 7 months. The cost in this line is the sum of the implicit interest costs in the last column of the Table 14.3 for lines 4-7.

Chapter 14. Examples of Cost and Return Estimates: Upper Midwest Dairy Farm

TABLE 14.3   Detailed Notes (continued)

[k] Interest on fuel and lube comes from Table 14A.9. This comes from paying interest at a nominal rate for the appropriate number of months on the expense for each operation from the month of operation until December 31st. Adding these interest expenses up over all the operations gives the total interest charges of $0.13.

[l] Interest on repairs comes from Table 14A.9. This comes from paying interest at a nominal rate for the appropriate number of months on the expense for each operation from the month of operation until December 31st and is $0.12265.

[m] Labor for soybean production is based on the machine operations performed adjusted by a labor multiplier. A description of how the cost of this labor was computed is contained in note [q] for Table 14.2. The hired labor costs are added up across operations to get the total labor cost for each type of labor. The cost of hired labor of the first type is $5.09 while the cost of labor of the second type is $0.39.

[n] The cost of operator labor is computed in a fashion similar to hired labor. The average nominal opportunity cost of the operator's labor in 1992 was projected to be $9.88. The real year-end cost was projected to be $10.05857. Total operator labor costs are $1.71, the same as with corn production, because the operator performs the same tasks for both crops.

[o] Interest is charged on each labor expense at a monthly nominal rate from the month of the expense to December 31st. Total interest expenses for labor are obtained by aggregating the expenses over operations and labor types. The total is $0.2084 . 0.21.

[p] Total labor cost is found by adding up the various types of labor expense and gives $7.39.

[q] Capital recovery is based on the difference between the beginning value (list price) of the various pieces of equipment and their real salvage value at the end of their useful life. This salvage value is discounted back to the present at a real interest rate of 5% and then subtracted from the initial value to obtain a net present cost of the equipment. This is then converted to a real annual annuity following the procedures outlined in Chapter 2 and equation 6.7. Consider the computation of the remaining value for the 140 HP used tractor owned by Ben and Bev. The nominal list price at the beginning of 1992 is $58,971 (Schedule 14.7). The projected useful life is 20 years with annual use of 250 hours of use for the first 5 years of life and 300 hours of use for the remaining 15 years of life. This gives total lifetime use of 5,750 hours. Average use per year is 287.5 hours. We compute the salvage value in the same dollars as the initial list price. We then adjust for inflation after computing the capital recovery cost. Using the equation from Table 6.3 we get an estimated remaining value at the end of 20 years of

$$rv\,(140\,HP\,used\,tractor\,,real)_{C\&P}\ '\ (58,971)\,(0.97690\,\&\,(0.02301)\,(20)^{0.76}\,\&\,(0.0012)\,(287.5)^{0.6})^{3.85}$$

$$'\ 16,367.5876\ .$$

TABLE 14.3   Detailed Notes (continued)

Notice that the salvage value of the this used 140 HP tractor is slightly higher than the new 140 HP tractor because it is used less hours over its lifetime given annual use of only 250 hours per year by the previous owner.

The capital service cost of the tractor is computed using equation 6.7. The used purchase price, not the list price, is used in the calculation.

$$
CSC_{140 \; HP \; used \; tractor} \; ' \; \frac{\left(PP \; \& \; \dfrac{SV}{(1\%r)^n} \right)}{\left(\dfrac{1 \; \& \; (1\%r)^{\&n}}{r} \right)} \; ' \; \frac{\left(33{,}745.8588 \; \& \; \dfrac{16{,}367.5876}{(1.05)^{10}} \right)}{\left(\dfrac{1 \; \& \; (1.05)^{\&10}}{.05} \right)}
$$

$$
' \; \frac{23{,}697.5798}{7.7217349} \; ' \; 3{,}068.945 \; .
$$

Because this is beginning-of-year value it is multiplied by (1.04) to obtain a year-end value of $3,191.7028. This is the value reported in Table 14A.2 in the Perry-Cross (P-C) capital recovery column. Taxes, insurance, and shelter (TIS) are charged at 2% of the average of purchase price and salvage value. This gives

TABLE 14.3   Detailed Notes (continued)

$$TIS_{140\ HP\ tractor} = \left(\frac{PP - SV}{2} \right)(0.02) = \frac{33,745.8588 - 16,367.5876}{2}(0.02)$$
$$= (25,056.7232)(0.02) = 501.134 .$$

Multiplying by 1.04 will give (501.134)(1.04) = $521.18. The sum of this and the capital recovery will give the total overhead cost for the tractor. This yields 521.18 + 3,191.70 = $3,712.88. Dividing this by 300 hours of annual use will give $12.38 per hour for overhead. This is the figure reported in Table 14A.3. Total capital recovery cost for all machines is $49.28. Detailed machinery computations are contained in Table 14A.9.

[r]   The cash rental rate for the quality of land is $85 per acre. Each acre of soybean requires 1 acre of land for a total cost of $85.00. It is assumed that this is all paid at the end of the year, or alternatively, that the $85 per acre cash rent is in year-end dollars.

[s]   Because insurance is included in footnote [q], no entry is made here. See footnote [v] of Table 14.2.

[t]   General farm overhead includes the soybean enterprise's share of office expense, the farm overhead portion of fuel, lube, and utilities and the farm overhead portion of maintenance and repairs. Using the data in Table 14A.8, these costs total $13,617.76 for 1992. The enterprise share for soybeans is $1,089.42 or $10.68 per acre.

Chapter 14. Examples of Cost and Return Estimates: Upper Midwest Dairy Farm

Table 14.4 A Sample Detailed CAR Summary for an Alfalfa Establishment Budget
1992 Projected Costs and Returns for Alfalfa Establishment Per Planted Acre on Owned Land, Detailed

Ben & Bev Dairyman Farm, Upper Midwest, USA (See Chapter 14 for a complete description of the farm)

Prepared by John Q. Taskforce, Department of Agricultural Economics, Anonymous State University, March 1992

	Item	Units	Quantity	Price	Month of Revenue/Expense	Value	Implicit interest
	Gross Value Of Production:						
1	Oatlage (a)	ton	2.50	15.000	5	37.50	1.976
2	Alfalfa Hay (b)	ton	1.50	50.000	8	75.00	2.233
3	Interest on Receipts to December (c)			0.092		4.21	
4	Total Revenue (d)					116.71	
	Operating Costs						
5	Oat Seed (e)	Bu	3.50	7	4	24.50	1.481
6	Alfalfa Seed (f)	lb	15.00	3.73	4	55.95	3.381
7	Dry Fertilizer (3-8-0) (g)	cwt	3.00	3.33	4	9.99	0.604
8	Potash (0-0-60) (g)	cwt	2.00	7.35	4	14.70	0.888
9	Custom Fert. Appl. (g)	Ac	1.00	3	4	3.00	0.181
10	Fuel & Lube (h)					11.67	0.554
11	Repairs (i)					9.20	
12	Interest on Oper. Inputs to Dec (j)					6.53	
13	Interest on Fuel & Lube to Dec (k)					0.55	
14	Interest on Repairs to Dec (l)					0.44	
15	Total Operating Costs (d)					136.53	
	Allocated Overhead						
16	Hired Labor 1(m)	HR	1.6132			15.82	
17	Hired Labor 2(m)	HR	0.4768			2.70	
18	Opportunity Cost of Operator Labor (n)	HR	0.4714			4.62	
19	Opportunity Cost of Son's Labor (n)	HR	0.0000				
20	Total Implicit Interest on Labor (o)					1.14	
21	Total Labor cost (p)					24.29	
22	Capital Recovery of Mach & Eq Inv(q)					87.81	
23	Opportunity Cost of Land (r)	Ac	1.0000	85.000		85.00	
24	Insurance (s)					0.00	
25	General Farm Overhead (t)					4.54	
26	Total Allocated Overhead (d)					225.93	
27	Total Costs Listed (d)					362.46	
28	Value Of Prod. Less Total Oper. Costs (d)					-19.82	
29	Value Of Prod. Less Total Costs Listed (d)					-245.75	

Chapter 14. Examples of Cost and Return Estimates: Upper Midwest Dairy Farm

TABLE 14.4   1992 Projected Costs and Returns for Alfalfa Establishment Per Planted Acre on Owned
Land, Detailed Notes

[a] Ben's best estimate of the price of oatlage (chopped green oats) at the end of May is $15.00 per ton.
He expects to harvest 2.5 tons. This gives revenue of $37.50 [(2.5)(15)].

[b] Ben figures to get one cutting of alfalfa for the year in August. He projects the yield to be 1.5 tons. The
projected alfalfa hay price in August is $50.00 per ton for revenue of $75.00.

[c] Interest on both revenue items are calculated from the time of occurrence until the end of December.
For example, the implicit interest on alfalfa hay is given by

$$ic \ \text{'} \ R(1\% \ i)^{\frac{n}{12}} \ \& \ R$$
$$\text{'} \ (75)(1.092)^{\frac{4}{12}} \ \& \ 75$$
$$\text{'} \ 2.233286 \ . \ 2.23 \ .$$

Line 3 is the total of the implicit interest columns in rows 1 and 2 of the table.

[d] Totals may not add due to rounding.

[e] Oat seed was planted at a rate of 3.5 bushels per acre. The price per lbs was projected to be $7.00 for
a total cost per acre of $24.50. Seed was purchased in and planted in April. The implicit interest is
computed from April 30th until the end of the year.

[f] Alfalfa seed was planted at a rate of 15 pounds per acre. The price per pound in April was projected
to be $3.73 for a total cost per acre of $55.95. Seed was purchased in and planted in April. The implicit
interest was computed from April 30th and is

$$ic \ \text{'} \ (55.95)(1.092)^{\frac{8}{12}} \ \& \ 55.95$$
$$\text{'} \ 3.381 \ .$$

[g] Three hundred pounds of dry fertilizer (3-8-0) and 200 pounds of potash (0-0-60) are applied in April
by a custom applicator. The cost of application is $3.00 per acre.

[h] Fuel and lubrication was computed using the engineering equations presented in Chapter 5. For a more
complete discussion see note [l] to Table 14.2. The fuel and lube cost is $11.67 and is reported in Table
14A.10 in the row labeled Fuel and Lube Cost per Acre (Current Month Prices) and the total column.

TABLE 14.4   Detailed Notes (continued)

[i]   Repair costs for each machine are estimated using the appropriate repair cost equations given in Chapter 5. Total repair costs are obtained by summing costs over the operations listed in Schedule 5c. Repair costs assume the power unit operates 10% longer than the time required to complete the operation just as with fuel and lubrication. More detail is contained in note [m] in Table 14.2. Total repair costs are given by adding up the costs for each operation needed to grow soybeans. The total from the row labeled Repair Cost per Acre (End-of-Year Prices) in Table 14A.10 is $9.198.

[j]   All input costs are assumed to occur on the last day of the month. Interest is compounded at a nominal monthly rate of 0.7361%. Real interest accrues at a monthly rate of 0.4074% while inflation occurs at a monthly rate of 0.32737%. An expense in January accrues interest for 11 months while an expense in May accrues interest for 7 months. The cost in this line is the sum of the implicit interest costs in the last column of Table 14.3 for lines 5-9.

[k]   Interest on fuel and lube comes from Table 14A.10. This comes from paying interest at a nominal rate for the appropriate number of months on the expense for each operation from the month of operation until December 31st. This is reported in Table 14A.10 in the line labeled Operating Interest on Fuel and Lube (Current Month Prices). Adding these interest expenses up over all the operations gives the total interest charges of $0.554.

[l]   Interest on repairs comes from Table 14A.10. This comes from paying interest at a nominal rate for the appropriate number of months on the expense for each operation from the month of operation until December 31st and is $0.43767.

[m]   Labor for alfalfa establishment is based on the machine operations performed adjusted by a labor multiplier. A description of how the cost of this labor was computed is contained in note [q] for Table 14.2. The hired labor costs are added up across operations to get the total labor cost for each type of labor. The total cost per acre for hired labor of the first type is $15.82 while the cost of labor of the second type is $2.70.

[n]   The cost of operator labor is computed in a fashion similar to hired labor. The average nominal opportunity cost of the operator's labor in 1992 was projected to be $9.88. The real year-end cost was projected to be $10.05857. Total operator labor costs are $4.62. This is quite a bit higher than for the corn or soybeans because the operator plants both oats and alfalfa.

[o]   Interest is charged on each labor expense at a monthly nominal rate from the month of the expense to December 31st. Total interest expenses for labor are obtained by aggregating the expenses over operations and labor types. The total is $1.14475.

[p]   Total labor cost is found by adding up the various types of labor expense and gives $24.29.

TABLE 14.4   Detailed Notes (continued)

[q]   Capital recovery is based on the difference between the beginning value (list price) of the various pieces of equipment and their real salvage value at the end of their useful life. This salvage value is discounted back to the present at a real interest rate of 5% and then subtracted from the initial value to obtain a net present cost of the equipment. This is then converted to a real annual annuity following the procedures outlined in Chapter 2 and equation 6.7. More detail is contained in note [t] of Table 14.2. Total capital recovery cost is $87.8065. Detailed machinery computations are contained in Table 14A.10.

[r]   The cash rental rate for the quality of land is $85 per acre. Each acre of alfalfa requires 1 acre of land for a total cost of $85.00. It is assumed that this is all paid at the end of the year, or alternatively, that the $85 per acre cash rent is in year-end dollars.

[s]   Because insurance is included in footnote [q], no entry is made here. See footnote [v] of Table 14.2.

[t]   General farm overhead includes the alfalfa establishment's share of office expense, the farm overhead portion of fuel, lube, and utilities and the farm overhead portion of maintenance and repairs. Using the data in Table 14A.8, these costs total $13,617.76 for 1992.   The enterprise share for alfalfa establishment is $136.17 or $4.54 per acre.

Schedule 14.1: 1991 Crop Acreage and Production - Ben & Bev Dairyman, Upper Midwest, U. S. A.

Crop OWNED LAND	Planted Acres	Harvested Acres	ASCS Base	Payment Acres	Flex Acres	ARP Acres	Production	ASCS Yield	Units	Landlord's Share
Corn	93	93	151	120	19.7	11.3	11,904	108	bu	0
Corn Silage	27	27					270		ton	0
Oats Silage	15	15					40		ton	0
Alfalfa - Haylage[a]	62	62					264		ton	0
Hay							146		ton	0
Soybean	95	95					4,294		bu	0
ARP	11.3	-					-			0
Total Owned Cropland	303.3	292					XX			XX
CASH RENTAL LAND										
Corn	21	21					1,690		bu	0
Oats Silage	15	15					30		ton	0
Alfalfa - Haylage[a]	21	21					81		ton	0
Hay							45		ton	0
Total Cash Rental Cropland	57	57					XX			XX
SHARE RENTAL LAND										
Corn	40	40					4,776		bu	1,592
Soybeans	7	7					285		bu	95
Total Share Rental Cropland	47	47					XX			XX
TOTAL CROP LAND	407	396					XX			XX

[a] Multiply by .4 to obtain equivalent tons of hay.

Chapter 14. Examples of Cost and Return Estimates: Upper Midwest Dairy Farm

Schedule 14.2:   **Livestock Production During 1991 - Ben & Bev Dairyman, Upper Midwest, U. S. A.**

	Milking Herd
Ave. No. Cows	89
Milk Sales Per Cow (lbs)	21,019
Cull Sales (Hd)	32
Bull Calves Trans. to Hired Worker 1 (Hd)	41
	Rearing Young Stock
Bulls (Hd)	5
Heifers Trans. to Herd (Hd)	37

Schedule 14.3:   **1991 Inventory, Use and Sales of Feed and Grain - Ben & Bev Dairyman, Upper Midwest, U. S. A.**

Crop	Beginning Inventory	Production	Use for Feed & Seed	Sales	Ending Inventory
Corn	22,145	16,778	15,646	5,777	17,500
Corn Silage	225	270	270	0	225
Oatlage	46	70	70	0	46
Alfalfa Haylage	225	250	252	0	223
Alfalfa Hay	119	152	149	0	122
Soybeans	462	4,484	-	2,698	2,248

Schedule 14.4: 1991 Labor Hours and Cash Wages - Ben & Bev Dairyman, Upper Midwest, U. S. A.

| Individual | Compensation | | | Annual Hours of Work | | | | | | | | |
	Cash	In Kind	Total	Dairy	Corn	Corn Silage	Oats-Alf. Estab.	Alfalfa	Soybeans	ARP Acres	Over-head	Total
Farm Operator				2,437	154	27	30	80	102	-	720	3,550
Spouse											30	30
Son (age 12)				330			30	100				460
Hired Worker 1	17,990	6,150[a]	24,140	2,173	191	54	30	45	52	5		2,550
Hired Worker 2	4,885		4,885	734	40	14	15	45	41	11		900
Hours Per Cow/Acre				63.8	2.5	3.5	3.5	3.25	1.9	1.45		

[a] The operator gives hired worker 1 the bull calves as part of his compensation. During 1991 worker 1 received 41 bull calves valued at $150 each.

Schedule 14.5A: Projected 1992 Operating Inputs and Machinery Operations For Corn After Soybean - Ben & Bev Dairyman, Upper Midwest, U.S.A.

MONTH	Operation	Hrs/Ac[a]	Machine 1	Machine 2	Item	Quantity/Acre	Units	Price/Unit
	Machinery Operations				**Operating Input**			
Nov	Apply Anhydrous	.124	Tractor 140 HP	Rented Applicator	Applicator Rental	1	ac	$0.50
					Anhydrous Ammonia	120	lb	0.094
Apr-May	Field Cultivate	.064	Tractor 140 HP	26' Field Cultivator				
	Plant	.138	Tractor 140 HP	8-36" Planter	Seed	28	1000	0.882
					Fertilizer 8-32-16	1	ac	8.95
					Zinc	1	lb	0.32
May	Rotary Hoe (30%)	.012	Tractor 90 HP	25' Rotary Hoe				
	Apply Herbicide	.036	Tractor 90 HP	66' Sprayer	Extrazine	2.2	lb	3.79
Jun	Cultivate	.069	Tractor 140 HP	8-36" Cultivator				
					Insurance	1	ac	4.45
Aug	Aerial Application of Herbicide				2-4-D and Custom Application	1	ac	7.25
Oct	Harvest	.131	Combine	4-36" Header				
	Haul Corn	.200	Tractor 140 HP	Four 300 Bu Grav. Wag.				
	Put Corn in Oxygen Limiting Silos	.200	Tractor 90 HP	Blower				
Nov	Chisel	.206	Tractor 140 HP	12' Chisel				
May	Plant Set Aside	.014	Tractor 90 HP	12' Drill	Seed	0.1	Bu	3.00
Aug	Mow Set Aside	.011	Tractor 90 HP	14' Mower				

[a] Hours per acre are the hours per acre for the implement multiplied by 1.2 and then adjusted for times over the acre.

Schedule 14.5B: Projected 1992 Operating Inputs and Machinery Operations For Soybean After Corn - Ben & Bev Dairyman, Upper Midwest, U. S. A.

	Machinery Operations				Operating Input			
MONTH	Operation	Hr/Ac[a]	Machine 1	Machine 2	Item	Quantity/Acre	Units	Price/Unit
May	Field Cultivate	.064	Tractor 140 HP	26' Field Cultivator				
	Plant	.138	Tractor 140 HP	13 Row Skip Planter(22.5' Wide)	Seed	70	lb	$0.142
	Rotary Hoe (30%)	.012	Tractor 90 HP	25' Rotary Hoe				
Jun	Apply Herbicide	.036	Tractor 90 HP	66' Sprayer	Pursuit	1	ac	13.20
	Cultivate	.069	Tractor 140 HP	13 Row Soybean Cultivator				
					Insurance	1	ac	3.94
Jul	Spot Walking				Hired Labor	0.4	hr	6.00
Oct	Harvest	.236	Combine	20' Header				
	Haul Grain	.200	Tractor 140 HP	Four 300 Bu Gravity Wagons				

[a] Hours per acre are the hours per acre for the implement multiplied by 1.2 and then adjusted for times over the acre.

[b] One-half are stored in a bin on the farm (average distance is 2 miles round trip) and the remaining one-half are hauled to the elevator (12 miles round trip).

Schedule 14.5C: Projected 1992 Operating Inputs and Machinery Operations For Alfalfa Establishment After Corn - Ben & Bev Dairyman, Upper Midwest, U. S. A.

MONTH	Machinery Operations				Operating Input			
	Operation	Hr/Ac[a]	Machine 1	Machine 2	Item	Quantity/Acre	Units	Price/Unit
Apr	Apply Fertilizer				3-8-0	3	cwt	$ 3.33
					0-0-60	2	cwt	7.35
					Custom Application	1	ac	3.00
	Field Cultivate	.064	Tractor 140 HP	26' Field Cultivator				
	Plant Oats	.236	Tractor 90 HP	12' Drill	Oats Seed	3.5	bu	7.00
	Plant Alfalfa	.236	Tractor 90 HP	12' Alfalfa Seeder	Alfalfa Seed	15	lb	3.73
Jun	Swath Oats	.177	Tractor 90 HP	14' Swather				
	Chop Oatlage	.337	Tractor 140 HP	Forage Harvester				
	Haul Oatlage	.600	Tractor 90 HP	Three Forage Wagons				
	Blow Oatlage	.200	Tractor 140 HP	Blower				
Aug	Swath Alfalfa	.177	Tractor 90 HP	14' Swather				
	Bale Hay	.236	Tractor 90 HP	Baler, Sq Bale				
	Haul Bales	.300	Tractor 140 HP	Three Hay Racks				

[a]Hours per acre are the hours per acre for the implement multiplied by 1.2 and then adjusted for times over the acre.

Schedule 14.6: Buildings and Improvements 12/31/91 - Ben & Bev Dairyman, Upper Midwest, U. S. A.

Item	Useful Life Remaining	Year of Purchase	Purchase Price	Book Value	Market Value[c]	Salvage Value	Annual Repairs	Percent Allocation Dairy	Overhead
Manure Pit[a]	10 Years	77	$ 5,342	$ 0	$ 2,000	0	[d]	100	
Harvestor[a]	20	77	18,000	4,900	8,000	0	[d]	100	
Heifer Barn[a]	20	78	12,320	3,770	5,000	0	[d]	100	
Harvestor[a]	20	80	49,890	26,000	20,000	0	[d]	100	
Dairy Barn[b]	15	80	40,000	16,500	40,000	0	[d]	100	
Stave Silo[b]	20	80	12,000	5,000	5,000	0	[d]	100	
Stave Silo[b]	10	80	2,000	0	1,000	0	[d]	100	
Old Barn[b]	10	80	4,000	0	3,000	0	[d]	100	
Hay Shed[b]	20	80	4,000	1,650	3,000	0	[d]	100	
Fences[b]	3	80	3,000	0	0	0	[d]	100	
Drain Tile[b]	20	80	32,946	9,300	30,000	0	[d]		100
Drying Bin[b]	10	80	2,500	150	1,500	0	[d]		100
Well & Water Sy[b]	10	80	10,000	4,200	5,000	0	[d]		100
Machine Shed[a]	30	87	22,923	18,797	20,000	0	[d]		100

SCHEDULE 14.6 (continued)

Item	Useful Life Remaining	Year of Purchase	Purchase Price	Book Value	Market Value[c]	Salvage Value	Annual Repairs	Percent Allocation Dairy	Overhead
Drain Tile[a]	30	91	2,370	2,370	2,000	0	[d]		100
Total Bldg & Imp		XX	XX	92,637	145,500	XX			
Land[a]		80	219,987	219,987	319,688	XX			
Total				312,624	465,188	XX			

[a] Purchased by Ben Dairyman in the year indicated.

[b] Purchased as part of the farm April 1 1980. The "purchase price" is the value established by the accountant in setting up the depreciation schedule in April 1980.

[c] Ben Dairyman's estimate of the amount the facility would add to the sale value of the farm if the farm were to be sold during 1992.

[d] Repairs and maintenance totaled $17,689 in 1991, which is approximately the average over the past 5 years. Of the total, $10,524 was for buildings and improvements allocated to the dairy enterprise, and $7,165 was spent to maintain buildings, improvements, driveways, etc. allocated to overhead.

Schedule 14.7: Machinery and Equipment Inventory 12/31/91 and Average Annual Use

Ben & Bev Dairyman, Upper Midwest, U. S. A.

Description	Size	Year of Purchase	1991 Purchase Price	Book Value	1992 Replacement Purchase Cost	List Price	Useful Life	Ann Use	Salv. Value	Hours of Use by Enterprise in 1991 b Corn	Corn Sil.	Alf. Est.	Alf. Prod.	Soybean	Other
Tractor	90 HP	75	$6,000	$0	30,550	33,605.0	20	350	9,104	28	5	44	122	12	139
Tractor	140 HP	80	30,000	0	53,610	58,971.0	20	300	16,286	57	14	16	44	23	146
Tractor Used (1982 model)a	140 HP	87	11,930	3,811	33,746	58,971.0	20	300	16,368	101	14	5	15	34	131
Tractor	90 HP	91	32,350	16,000	33,250	36,575.0	20	350	9,403						350
Combine	140 HP	90	77,000	28,531	81,000	89,100.0	15	70	16,207	40				30	0
Chisel Plow	12 FT	88	6,630	4,310	4,150	4,565.0	20	40	2,219	34	6				0
Tandem Disc	19 FT	77	2,500	0	10,150	11,165.0	20	20	2,710						20
Field Cultivator	26 FT	82	6.63	0	9,515	10,466.5	20	32	546	15	3	3		10	1
Grain Drill (1980 model)	12 FT	87	420	231	8,375	9,212.5	25	13	2,045			10			3
Alfalfa Seeder	12 FT	77	3,200	0	4,500	4,950.0	25	10	1,099			10			0
Planter, Corn & Soybeans	20 FT	89	15,090	7,232	16,450	18,095.0	15	75	6,395	42	8			25	0
Rotary Hoe	25 FT	91	3,774	2,399	3,850	4,235.0	20	10	221	5	1			4	0
Cultivator, Corn (8 row)	24 FT	89	8,772	5,703	9,650	10,615.0	15	30	1,019	26	4				0
Cultivator, Soybean (13 row)	22.5 FT	89	3,000	0	3,250	3,575.0	15	15	343					15	0
Sprayer	66 FT	80	2,500	0	4,225	4,647.5	15	15	446	8	2			5	0

Schedule 14.7: Machinery and Equipment Inventory 12/31/91 and Average Annual Use

Ben & Bev Dairyman, Upper Midwest, U. S. A.

Description	Size	Year of Purchase	Purchase Price	1991 Book Value	1992 Purchase Cost	Replacement List Price	Useful Life	Ann Use	Salv. Value	Corn	Corn Sil.	Alf. Est.	Alf. Prod.	Soybean	Other
Corn Head for Combine	4-36"	90	12,695	3,210	12,695	13,964.5	15	40	1,251	40					0
Soybean Head for Combine	20 FT	90	11,325	3,923	11,325	12,457.5	15	30	1,116					30	0
2 Gravity Box Wagons	300 BU	77	2,400	0	5,600	6,160.0	20	80	642	50				30	0
2 Gravity Box Wagons	300 BU	89	5,407	1,491	5,600	6,160.0	20	80	642	50				30	0
Forage Harvestor		82	8,714	890	10,800	11,880.0	15	60	1,065		20	10	30		0
Pick Up Harvester Head		82	2,100	210	2,610	2,871.0	15	40	524			10	30		0
Two Row For. Har. Head	2-36"	82	4,300	440	5,319	5,850.9	15	20	257		20				0
3 Forage Wagons		80	16,200	0	20,625	22,687.5	15	40	2,178			10	30		0
Swather, Pull Type	14 FT	87	7,653	4,210	8,350	9,185.0	20	62	447			12	50		0
Windrow Inverter		89	3,100	0	3,350	3,685.0	29	10					10		0
Baler		81	8,400	0	8,920	9,812.0	15	65	3,308			10	55		0
3 Baled Hay Wagons		90	4,681	0	6,225	6,847.5	20	65	357			10	55		0
Silage Blower		80	3,200	0	4,025	4,427.5	15	100	397	40	20	10	30		0
Manure Equipment		87	30,894	8,742	37,073	40,780.0	12	200	5,272						200
Feed Handling Equipment		85	20,705	1,438	24,846	27,331.0	15	133	2,624						133
Milking Equipment		84	18,450	3,795	27,675	30,442.0	15	1100	2,923						1100
4WD Pickup Truck		86	13,925	2,420	15,000	16,500.0	15	400	5,000						400
Total				98,986											

a The tractor had a new purchase price of $31,500 in 1982. It was purchased used at the beginning of 1987 for $26,419.

   The purchase price listed is the nominal value of $26,419 as of the beginning of 1992. The tractor had 1,250 hours of accumulated use when purchased.

b The total includes the hours of use on set aside, the dairy enterprises, and various and sundry tasks such as weed control around the farmstead.

Schedule 14.8: Annual Business Overhead Costs - Ben & Bev Dairyman, Upper Midwest, U. S. A.

Description	Total Cost	Percent Allocation by Enterprise						
		Corn	Corn Silage	Oats-Alf.Est	Alfalfa	Soybeans	Dairy Cows	Dairy Replacements
Office Expense	$ 1,194	11	1	1	5	8	65	9
Fuel, Lube & Utilities[a]	3,500	11	1	1	5	8	65	9
Maintenance & Repairs[a]								
Bldg.& Improv.	7,165	11	1	1	5	8	65	9
Mach. & Equip.	1,235	11	1	1	5	8	65	9
Real Estate Taxes[b]	3,244						12	6
Farm Insurance[a]	880	11	1	1	5	8	65	9
Interest on Real Estate Loan[b]	14,767						12	6

[a]The costs listed are in addition to the fuel, lube, utilities, repairs, and crop insurance listed as operating costs in the projected CAR estimates.

[b]The opportunity costs on real estate listed in the projected costs and returns for crops implicitly include a return on the investment and real estate taxes. Thus, real estate taxes and interest on the real estate loan are not included in the projected CAR estimates for crops. Approximately 69% of the appraised value of the real estate is for the land, 13% for crop and machinery storage facilities, and 18% for livestock facilities. The estimates in Chapter 13 allocate 12% of taxes to the dairy herd and 6% of the taxes to dairy replacements. The estimates in Chapter 14 compute taxes for machinery and equipment according the formula in footnote t of Table 14.2 (2% of the average of purchase price and salvage value) and do not attempt to allocate the 13% crop share of 1991 taxes. In preparing historic CAR estimates (not included here), Ben and Bev allocate 82% of the real estate taxes and interest on the real estate loan to crops and 18% to the dairy cattle.

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APPENDIX 14A

SUPPLEMENTARY DATA TABLES FOR CHAPTER 14

Overview

This appendix contains data tables that support the CAR estimates in Tables 14.1 to 14.4. Table 14A.1 contains machinery and labor data for the production of corn. Table 14A.2 contains the general parameter assumptions and data used to estimate machine and labor costs. Included in the first section are interest and inflation rates, the prices of fuel, and labor costs. The second section contains prices, useful life, annual use, and various engineering coefficients for powers units and implements. Data on fuel type, horsepower, and field capacity are also included. This report assumes that power units operate 10% longer than actual field time, while labor hours are 20% higher than field time. Table 14A.3 calculates salvage (remaining) values for all machinery units. Based on these values, list and purchase prices, and the other parameters, the table then gives estimates of capital recovery, taxes, insurance and shelter, fuel and lube, and repair expenses for each power unit and implement on a per hour basis. Table 14A.4 uses the cost estimates from Table 14A.3 to compute the operating and overhead costs for various machine complements used on the Ben and Bev Dairyman operation. These costs are reported on a per acre basis. Table 14A.5 gives the data and calculations used to compute the field capacity of the various implements used. Table 14A.6 gives detailed calculations for capital recovery for three example pieces of equipment. Table 14A.7 shows the data and calculations used to estimate nominal monthly labor costs. Table 14A.8 presents data on general overhead expenses and how they are allocated to the alternative crops. Table 14A.9 contains machinery and labor cost estimates for the production of soybeans. Table 14A.10 contains machinery and labor information for the establishment of alfalfa with an oats nurse crop.

Data, Assumptions, and Calculations Used for Estimating Machine Costs

Table 14A.2 contains the assumptions used to estimate machine costs. In late 1991, Ben estimated what it would cost him to purchase a new machine to replace each one on his farm. Based on discussions with local extension specialists, a list price 10% higher than this purchase price was used for each machine. One of Ben's used 140 HP tractors was included in the estimates as an example of how to handle used machines. The useful life of all tractors was assumed to be 20 years. The combine's expected life was assumed to be 15 years. Most other machines were given an expected life of 15 or 20 years based on discussions with Ben and the experience of John Q. Taskforce. Estimated annual use was based on past use in Ben's operation. Repair cost factors are from ASAE 1997 while the remaining value factors come from both ASAE 1997 and Cross and Perry (1995, 1996). The latest versions of the Cross-Perry equations given in Table 6.4 were not used since they were not officially in print at the time this report was published.

Field capacities were estimated using equation 5.6, which is repeated here for convenience. Calculated area capacity is computed as

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$$C_a = \frac{(S)\,(W)\left(\dfrac{E_f}{100}\right)}{8.25} \qquad\qquad \textbf{(5.6)}$$

where

C_a =   acres per hour calculated capacity
S   =   implement speed in miles per hour
W   =   measured width of the implement in feet
E_f =   field efficiency, the ratio of effective accomplishment compared to theoretical accomplishment, expressed in percent
8.25   =   43,560 (square feet per acre) divided by 5,280 (feet per mile) = width of acre 1 mile long.

The efficiency and field speed data are taken from ASAE 1997. Table 14A.5 contains the width, speed, efficiency, and estimated acres per hour for each machine. The forage harvester is a two-part machine including a base unit that is pulled by a tractor and a head which attaches. One head is for cutting row crops such as corn silage, while the other is a platform head for cutting crops such as alfalfa or green oats. The combine also has two heads, one for row crops and one for crops such as soybeans or wheat.

Salvage values (SV) are computed using the formulas in Tables 6.2-6.4 and the coefficients in Table 14A.3. Capital recovery is then based on equation 6.7. The purchase price, not the list price, is used in the calculation. The specific formula is

$$CSC = \frac{\left(PP - \dfrac{SV}{(1+r)^n}\right)}{\left(\dfrac{1 - (1+r)^{-n}}{r}\right)}$$

where r is the real interest rate, n is the useful life, and PP is the purchase price. Because this value is based on beginning-of-year prices, it is multiplied by (1.04) to obtain a year-end value. Detailed calculations for three machines are contained in Table 14A.6. Taxes, insurance, and shelter (TIS) are charged at 2% of the average of purchase price and salvage value.

Fuel consumption in gallons per hour is calculated using equation 5.19 which for a diesel engine is

$$Diesel_{gph} = (.06)\,(PTO_{max})\,(.73)$$

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The diesel cost is assumed to be $0.90 per gallon on January 1, 1992. Lubrication is assumed to be 15% of fuel costs.

Cumulative repairs (C_{mt}) after h_t hours of use with a list price of P_t are calculated using equations 5.8 and 5.9. Equation 5.8 is repeated here for convenience

$$C_{rmt} ' (RF1)(P_t)\left(\frac{h_t}{1,000}\right)^{RF2}.$$ **(5.8)**

The coefficients RF1 and RF2 come from ASAE 1997. Equation 5.9 is used to convert this to a cost per hour.

Calculation of Machine Complement Costs

Each field operation requires a specific machine complement, usually a power unit and an implement. The cost to use the complement for a given operation is the cost per hour for each piece of equipment multiplied by their respective field multipliers (1.1 for tractors and combines and 1 for all other implements) and divided by the acres per hour for the implement. This will then give a cost per acre for the operation. Consider, for example, the costs per acre to bale hay. The operation uses the newer 90 HP tractor and the baler. The repair cost per hour for the tractor is $1.86. The repair cost per hour for the baler is $2.30. The field capacity of the baler is 5.09 acres per hour. The repair and maintenance (C_{rm}) cost per acre is then given by

$$C_{rm\,per\,acre}(baling) ' \frac{(1.1)(1.86) \% (1)(2.30)}{5.09}$$
$$. \ 0.85 .$$

The fuel and lube (C_{FL}) cost per acre for baling is the fuel and lube cost per hour for the tractor divided by the field capacity of the baler or

$$C_{FL\,per\,acre}(baling) ' \frac{(1.1)(4.08)}{5.09}$$
$$. \ 0.88 .$$

The labor cost per acre is the total number of hours of labor time divided by the field capacity multiplied by the cost per hour for the type of labor used. The more expensive full-time hired man usually bales the hay. With a labor multiplier of 1.2 this will give

$$C_{Labor\,per\,acre}(baling) \doteq \left(\frac{1.2}{5.09}\right) \quad (10.023)$$
$$\dot= 2.36$$

as the cost per acre for labor in baling hay.

The overhead costs per acre are computed in the same fashion as the repair costs by aggregating over the power unit and the implement. For baling this will give a cost of capital recovery or overhead of

$$C_{CCR\,per\,acre}(baling) \doteq \frac{(1.1)(8.32) \% (1)(13.25)}{5.09}$$
$$\dot= 4.401 .$$

The repair costs are in real end-of-year prices. The fuel and lube costs are in beginning-of-year nominal prices. The labor costs are in real end of year prices. The overhead costs are in real end-of-year prices. The overhead costs are only charged at the end of the year and so need no adjustment. The labor costs will need to be deflated to get a nominal labor cost for the month of operation. The fuel costs will need to be inflated to get a nominal cost for the month of operation. The repair costs, though specified in end-of-year terms, will be used as if they were monthly nominal prices for the purpose of computing operating interest. These adjustments will be made in Tables 14A.1, 14A.9, and 14A.10.

Costs of Corn Production

The machinery and labor costs of corn production are computed in Table 14A.1. Each operation is represented by a column in the table. Each activity is represented by a complement number from Table 14A.4. The month of the operation is also specified. Anhydrous is applied in November of the previous year. It was decided to charge the chiseling in the 11th month of the production year rather than the 11th month of the previous year because the chiseling is really a close-out activity for corn production. The acres per hour and hours per acre are listed to make the computations clear. The first cost row lists the fuel and lube cost for the operation in beginning-of-year prices from Table 14A.4 multiplied by times over. The next row lists the repair cost per acre in end-of-year prices from Table 14A.4 multiplied by times over. For most operations, times over is 1, but for the rotary hoe it is 0.3, meaning only 30% of the acres are rotary hoed each year. The times over is larger (1.06) for the chisel plowing because it is performed on crop acres and the set-aside acres while the times over is only 0.06 for the set-aside acres. The next row lists the total labor hours per acre. This is computed by dividing the labor multiplier (1.2) by the field capacity of the machine and then multiplying by the times over for this operation. The total hours per acre are divided according to the labor type from Table 14A.4. These labor costs are in end-of-year prices. The second section of the table adjusts the prices to nominal terms in the month of operation. The first row is for fuel and lubrication. For example, the beginning of year cost for combining corn of $0.76185 is adjusted to the end of October as follows

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$$C_{F\&L\&\ Nominal}(Combining\ in\ Oct)\ '\ 0.76185\ (1.04)^{\frac{10}{12}}$$
$$'\ 0.78716\ .$$

Labor costs are also adjusted to a current month basis from an end-of-year basis. The cost of applying herbicide is adjusted from an end-of-year value of \$0.35711 to \$0.34903 at the end of May as follows

$$C_{Labor\ \&\ Nominal}(Spraying\ in\ May)\ '\ 0.35711\ (1.04)^{\&\frac{7}{12}}$$
$$'\ 0.34903\ .$$

The labor costs are then allocated according to the specifications in Table 14A.4. The operating costs per acre as taken from Table 14A.4 are in the next row while the costs using current month prices (except for repairs) are in the following row. Interest costs (ic) are then computed on each of the three types of expenses, fuel and lube, repairs, and labor. These are computed using equation 2.15 which is repeated here for convenience.

$$ic\ '\ R(1\%\ i)^{\frac{n}{12}}\ \&\ R\ . \tag{2.15}$$

For example, the interest cost on the labor to field cultivate is computed as

$$ic_{Labor}(Field\ Cultivate)\ '\ 0.62693(1.092)^{\frac{7}{12}}\ \&\ 0.62693$$
$$'\ 0.03303\ .$$

The overhead costs per acre come from Table 14A.4 multiplied by times over. They are in end-of-year terms. The total operating interest is the sum of the operating interest on fuel and lubrication, repairs and labor.

The last column in the table gives the sum for each row over the operations in the columns. The various numbers in the table are then used in different parts of the summary estimates.

Costs of Soybean Production

Table 14.9 is very similar to Table 14.1 which is for corn production. Many of the costs are the same because the same field operations are used.

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Costs of Alfalfa Establishment

Table 14.10 is similar to Table 14.1 which is for corn production. Two crops are now planted and harvested. In this case, the revenues occur before the end of the year and so some interest on the revenue accrues. Labor use is higher with the harvesting of two crops and the hauling of hay.

Labor Costs

Table 14A.7 contains detailed data used in constructing labor costs. Data on total labor hours and their allocation from Schedule 14.4 are used to compute an implicit nominal wage for 1991 for the two hired men. The operator valued his time at $9.50 per hour and his son's time at the implicit hired wage for the part-time worker. The wages in the last column are the 1991 wages adjusted for 4% inflation. The hours per enterprise are Ben Dairyman's best estimate of allocations for 1991. The costs per acre are then computed from the total number of hours multiplied by the 1992 wage rate divided by the number of acres grown. This then gives an estimated cost per acre based on Ben's 1991 estimates of hours used. These total labor costs per acre are as follows:

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Worker	Corn Per Acre Nominal Cost	Oats-Alf Per Acre Nominal Cost	Soybean Per Acre Nominal Cost
Operator	9.88	9.88	9.88
Son	0	5.644889	0
Hired worker 1	12.2108	9.845333	5.01919
Hired worker 2	1.4662	2.822444	2.26902
Total Hired	13.677	12.66778	7.28821
Total cost per acre	**23.557**	**28.19267**	**17.1682**
1991 allocations			
Operator	1.71	4.62	1.71
Son		0.00	
Hired worker 1	9.41	14.09	5.09
Hired worker 2	0.45	2.70	.39
Total cost per acre	**$11.57**	**21.41**	**$7.19**
1992 machine calculations			

The calculations using the machinery data are an underestimate of labor used, probably due to the small amount of the operator's time actually devoted to field work. Notice, also, that the son was planning to be away at college in 1992 and so provided no labor.

Monthly nominal labor charges can be computed using the technique suggested in Chapter 2 and discussed in footnote [q] of Table 14.2. The nominal average price for 1991 is adjusted to get a nominal average price for 1992. A real year-end price that will give this nominal average is then obtained from equation 2.35. This is given by

$$
p^r = \frac{(12)(\bar{p}^n)}{\sum_{j=1}^{12} (1\%p_m)^{j\&12}}
$$

$$
= \frac{(12)(\bar{p}^n)}{(1\%p_m)\sum_{j=1}^{12} (1\%p_m)^{(j\&12\&1)}} \qquad (2.35)
$$

$$
= \frac{(12)(\bar{p}^n)}{(1\%p_m)US_0(p_m,12)} .
$$

where p_m is the monthly rate of inflation and $\bar{p}_n$ is the nominal average price. For the case at hand and the operator we obtain

$$p^r = \frac{(12)(9.88)}{(1.003274)\left[\dfrac{1 - (1.003274)^{-12}}{0.003274}\right]}$$

$$= \frac{118.56}{(1.003274)\left[\dfrac{1 - 0.961535}{0.003274}\right]}$$

$$= \frac{118.56}{(1.003274)(11.74848)}$$

$$= 10.0586 .$$

The nominal monthly prices are then obtained using equation 2.36 which is repeated here

$$p_j^n = p^r(1+p_m)^{j-12} \tag{2.36}$$

where p_j^n is the nominal price in the jth month.

Table 14A.1 Machine and labor costs for corn production

Real Interest rate	0.05					
Inflation rate	0.04					
Nominal Interest Rate	0.092					

Operation Description	Apply Anhydrous	Field Cultivate	Plant Corn	Rotary Hoe	Apply Herbicide	Row Cultivate
Complement #	1	2	3	4	8	5
Complement Description	Apply Anhydrous	Field Cultivate Corn/Oats	Plant corn/soy	Rotary Hoe	Spray	Row Cultivate
Month of Operation	-2	5	5	5	5	6
Field Rate Data						
'Acres Per Hour	9.69697	18.75152	8.66667	29.09091	33.80000	17.45455
'Hours Per Acre	0.10313	0.05333	0.11538	0.03438	0.02959	0.05729
Times Over	1	1	1	0.3	1	1
Fuel & Lube Cost per Acre (Beg Year Prices)	0.71994	0.37230	0.80553	0.04628	0.13278	0.39997
Repair Cost per Acre (End of Year Prices)	0.29220	0.34517	**1.11790**	0.02663	0.09814	**0.27121**
Total Labor Hours Per Acre	0.12375	0.06399	0.13846	0.01238	0.03550	0.06875
Operator Labor Hours Per Acre	0.00000	0.00000	0.13846	0.00000	0.03550	0.00000
Hired 1 Labor Hours Per Acre	0.12375	0.06399	0.00000	0.01238	0.00000	0.00000
Hired 2 Labor Hours Per Acre	0.00000	0.00000	0.00000	0.00000	0.00000	0.06875
Total Labor Cost per Acre (Real End Year Prices)	1.24038	0.64144	1.39273	0.12404	**0.35711**	0.39510
Operator Labor Cost per Acre (Real End Year Prices)			1.39273		0.35711	
Hired 1 Labor Cost per Acre (Real End Year Prices)	1.24038	0.64144		0.12404		
Hired 2 Labor Cost per Acre (Real End Year Prices)						**0.39510**
Fuel & Lube Cost per Acre (Current Month Prices)	0.71525	0.37844	**0.81880**	0.04704	0.13497	**0.40789**
Total Labor Cost per Acre (Current Month Prices)	1.18490	**0.62693**	1.36122	0.12123	**0.34903**	0.38743
Operator Labor Cost per Acre (Current Month Prices)	0.00000	0.00000	**1.36122**	0.00000	0.34903	0.00000
Hired 1 Labor Cost per Acre (Current Month Prices)	1.18490	0.62693	0.00000	0.12123	0.00000	0.00000
Hired 2 Labor Cost per Acre (Current Month Prices)	0.00000	0.00000	0.00000	0.00000	0.00000	**0.38743**
Operating Costs per Acre (Stated Prices)	2.25252	1.35892	3.31616	0.19695	0.58803	1.06628
Operating Costs per Acre (Current Month Except Repairs)	2.19236	1.35054	3.29793	0.19491	0.58214	1.06653
Operating Interest on Fuel & Lube (Current Month Prices)	0.07734	0.01994	**0.04313**	0.00248	0.00711	**0.01835**
Operating Interest on Repairs (End of Year Prices)	0.03160	0.01818	**0.05889**	0.00140	0.00517	**0.01220**
Operating Interest on Labor (Current Month Prices)	0.12813	**0.03303**	**0.07171**	0.00639	0.01839	0.01743
Overhead Costs per Acre (End of Year)	1.77286	2.19510	4.41069	0.46221	1.15914	**2.74456**
Total Cost per Acre (Stated Prices)	4.02538	3.55401	7.72684	0.65916	1.74716	3.81084
Total Cost per Acre (Adjusted Prices)	3.96522	3.54564	7.70861	0.65712	1.74127	3.81109
Total Operating Interest on Above	0.23707	0.07115	0.17374	0.01027	0.03067	0.04798
Total Costs including Interest	4.20229	3.61679	7.88235	0.66739	1.77194	3.85907

Table 14A.1 Machine and labor costs for corn production (continued)

Operation Description	Combine Corn	Haul Corn	Blow Corn	Chisel Plow	Plant Set Aside	Mow Set Aside	Total All Operations
Complement #	6	7	9	10	11	12	
Complement Description	Combine Corn	Haul Corn/Soy	Blow Corn	Chisel Plow	Plant Set-aside	Mow Set-aside	
Month of Operation	10	10	10	11	5	8	
Field Rate Data							
'Acres Per Hour	9.16364	6.00000	6.00000	6.18182	5.09091	6.78788	
'Hours Per Acre	0.10913	0.16667	0.16667	0.16176	0.19643	0.14732	
Times Over	1	1	1	1.06	0.06	0.06	
Fuel & Lube Cost per Acre (Beg Year Prices)	0.76185	1.16355	0.74799	1.19708	0.05289	0.03967	6.43985
Repair Cost per Acre (End of Year Prices)	0.56736	1.13618	0.57523	0.89677	0.03466	0.03542	**5.39688**
Total Labor Hours Per Acre	0.13095	0.20000	0.20000	0.20576	0.01414	0.01061	**1.20430**
Operator Labor Hours Per Acre	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.17396
Hired 1 Labor Hours Per Acre	0.13095	0.20000	0.20000	0.20576	0.01414	0.00000	0.95098
Hired 2 Labor Hours Per Acre	0.00000	0.00000	0.00000	0.00000	0.00000	0.01061	0.07936
Total Labor Cost per Acre (Real End Year Prices)	1.31257	2.00466	2.00466	2.06244	0.14176	0.06096	11.73783
Operator Labor Cost per Acre (Real End Year Prices)							1.74983
Hired 1 Labor Cost per Acre (Real End Year Prices)	1.31257	2.00466	2.00466	2.06244	0.14176		9.53193
Hired 2 Labor Cost per Acre (Real End Year Prices)						0.06096	0.45606
Fuel & Lube Cost per Acre (Current Month Prices)	**0.78716**	1.20220	0.77285	1.24091	0.05377	0.04072	**6.60000**
Total Labor Cost per Acre (Current Month Prices)	1.30402	1.99159	1.99159	2.05571	0.13855	0.06017	11.57238
Operator Labor Cost per Acre (Current Month Prices)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.71025
Hired 1 Labor Cost per Acre (Current Month Prices)	1.30402	1.99159	1.99159	2.05571	0.13855	0.00000	9.41453
Hired 2 Labor Cost per Acre (Current Month Prices)	0.00000	0.00000	0.00000	0.00000	0.00000	0.06017	0.44759
Operating Costs per Acre (Stated Prices)	2.64178	4.30439	3.32788	4.15629	0.22931	0.13604	23.57455
Operating Costs per Acre (Current Month Except Repairs)	2.65854	4.32998	3.33967	4.19338	0.22698	0.13630	23.56926
Operating Interest on Fuel & Lube (Current Month Prices)	0.01163	0.01776	0.01142	0.00913	0.00283	0.00121	**0.22235**
Operating Interest on Repairs (End of Year Prices)	0.00838	0.01679	0.00850	0.00660	0.00183	0.00105	**0.17060**
Operating Interest on Labor (Current Month Prices)	0.01927	0.02943	0.02943	0.01513	0.00730	0.00179	**0.37742**
Overhead Costs per Acre (End of Year)	18.01304	4.43071	2.24225	3.80379	0.72598	0.19128	**42.15160**
Total Cost per Acre (Stated Prices)	20.65482	8.73509	5.57013	7.96008	0.95529	0.32733	65.72616
Total Cost per Acre (Adjusted Prices)	20.67158	8.76069	5.58192	7.99717	0.95296	0.32759	**65.72086**
Total Operating Interest on Above	0.03928	0.06398	0.04935	0.03087	0.01196	0.00406	**0.77037**
Total Costs including Interest	20.71087	8.82467	5.63127	8.02804	0.96492	0.33164	**66.49123**

Stated prices are beginning of year prices for fuel, lube and labor and end of year prices for repairs and overhead

Adjusted prices are in current months for fuel, lube and labor and end of the year for repairs and overhead

Table 14A.2 General assumptions and data used to estimate machinery costs

Interest and inflation rates

Real Interest Rate	0.05	Monthly Real Interest Rate	0.004074
Inflation Rate	0.04	Monthly Inflation Rate	0.003274
Nominal Interest Rate	0.092	Monthly Nominal Int. Rate	0.007361

Fuel Prices

Fuel Prices	Type	Price
gas	1	1.275
diesel	2	0.90
LP gas	3	0.65

Wage Rates

Operator (O)	10.05857016
Hired Person 1 (H1)	10.02327693
Hired Person 2 (H2)	5.746914063
Son	5.746914063
Labor Multiplier	1.2

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Assumed values for machinery

Power Unit #	Description	List price	Purchase Price	Useful Life	Previous Use (hrs)	Remain Life (yrs)	Annual use (hrs)	HP	Fuel type (1,2,3)	Remaining Value Factors RV1	RV2	Repair cost Factors RF1	RF2	int	ageco	ageex	hrsco	hrsex	expon
1	90 HP TRACTOR	33605	30550	20	0	20	350	90	2	0.68	0.92	0.007	2.00	0.9769	-0.023	0.76	0	0.6	3.85
2	140 HP TRACTOR	58971	53610	20	0	20	300	140	2	0.68	0.92	0.007	2.00	0.9769	-0.023	0.76	0	0.6	3.85
3	140 HP TRACTOR	58971	33745.86	20	2750	10	300	140	2	0.68	0.92	0.007	2.00	0.9769	-0.023	0.76	0	0.6	3.85
4	90 HP TRACTOR	36575	33250	20	0	20	350	90	2	0.68	0.92	0.007	2.00	0.9769	-0.023	0.76	0	0.6	3.85
5	140 HP COMBINE	89100	81000	15	0	15	70	140	2	0.64	0.885	0.040	2.10	0.9453	-0.0455	0.87	0	0.72	2

Implement Unit #	Description	List price	Purchase Price	Useful Life	Previous Use (hrs)	Remain Life (yrs)	Annual use (hours)	Field capacity (a/hr)	Typical Field Capacity	RV1	RV2	RF1	RF2	int	ageco	ageex	hrsco	hrsex	expon
1	12FT. CHISEL PLOW	4565	4150	20	0	20	40	6.18	6.18	0.6	0.885	0.28	1.4	0.6114	0.47309	-0.95			1.61
2	19 FT. TANDEM DISK	11165	10150	20	0	20	20	11.05	11.05	0.6	0.885	0.18	1.7	0.452	0.60697	-0.85			2.04
3	FLD. CULT., 26 FT.	10467	9515	20	0	20	32	18.75	18.75	0.6	0.885	0.27	1.4						
4	GR. DRILL, 12 FT.	9212.5	8375	25	0	25	13	5.09	5.09	0.6	0.885	0.32	2.1	0.8041	-0.0194	0.89			1.96
5	ALFALFA SEEDER, 12 FT.	4950	4500	25	0	25	10	5.09	5.09	0.6	0.885	0.32	2.1	0.8041	-0.0194	0.89			1.96
6	PLANTER, 8 row narrow	18095	16450	15	0	15	75	8.67	8.67	0.6	0.885	0.32	2.1	0.8041	-0.0194	0.89			1.96
7	ROTARY HOE, 25 FT.	4235	3850	20	0	20	10	29.09	29.09	0.6	0.885	0.23	1.4						
8	CULTIVATOR, 8 row (36")	10615	9650	15	0	15	30	17.45	17.45	0.6	0.885	0.17	2.2						
9	CULTIVATOR, 13 skip-row (18")	3575	3250	15	0	15	15	10.91	10.91	0.6	0.885	0.17	2.2						
10	SPRAYER, 66 FT.	4647.5	4225	15	0	15	15	33.80	33.80	0.6	0.885	0.41	1.3						
11	CORN HEAD, 8 row (36")	13965	12695	15	0	15	40	9.16	9.16	0.56	0.885	0.12	2.3						
12	GR. PLAT., SB 20 FT.	12458	11325	15	0	15	30	5.09	5.09	0.56	0.885	0.12	2.3						
13	HAUL GRAIN, 4 300 BU Wagons	12320	11200	20	0	20	80	6.00	6.00	0.6	0.885	0.19	1.3						
14	SILAGE HARVESTER	11880	10800	15	0	15	60	-	-	0.56	0.885	0.15	1.6						
15	SILAGE HARV, platform (14')	2871	2610	15	0	15	40	3.56	3.56	0.56	0.885	0.15	1.6						
16	SILAGE HARV, 2 row	5850.9	5319	15	0	15	20	1.53	1.53	0.56	0.885	0.15	1.6						
17	HAUL SILAGE, 14 ft	22688	20625	15	0	15	40	2.00	2.00	0.6	0.885	0.16	1.6						
18	MOW. CONDIT., 14 FT.	9185	8350	20	0	20	62	6.79	6.79	0.56	0.885	0.18	1.6						
19	WINDROW INVERTER	3685	3350	20	0	20	10	8.15	8.15	0.6	0.885	0.17	1.4						
20	SQ. BALER, 14 FT.	9812	8920	15	0	15	65	5.09	5.09	0.56	0.885	0.23	1.8	0.9543	-0.0594	0.57			2.78
21	HAUL HAY, 15 FT.	6847.5	6225	20	0	20	65	4.00	4.00	0.6	0.885	0.19	1.3						
22	GRAIN AUGER	2100	1890	12	0	12	10	5.38	5.38	0.56	0.885	0.22	1.8						
23	FORAGE BLOWER, 14 FT.	4427.5	4025	15	0	15	100	6.00	6.00	0.56	0.885	0.22	1.8						
24	ANHYDROUS APPLICATOR							9.70	9.697										

Table 14A.3 Costs of operating various tractors and implements for the Dairyman farm

Power Unit #	Description	Salvage Value C-P	Salvage Value ASAE	C-P Capital Recovery	ASAE Capital Recovery	Taxes, ins., shelter	Total overhead costs	Fuel	Lube	Prior Repairs	Cum Repairs (life)	Repairs per year	Total F&L costs	Total operating costs	Total costs	Overhead Costs per Hr.	F&L Costs per Hr.	Repair Costs per Hr	Operating Costs per Hr.
1	90 HP TRACTOR	9104.26	4311.907	2263	2414	412	2676	1242	186	0	11988	599	1428	2027	4703	7.64	4.08	1.71	5.79
2	140 HP TRACTOR	16286.2	7566.655	3962	4236	727	4689	1656	248	0	15455	773	1904	2677	7365	15.63	6.35	2.58	8.92
3	140 HP TRACTOR	16367.6	7566.655	3192	3919	521	3713	1656	248	3247	14194	1095	1904	2999	6712	12.38	6.35	3.65	10.00
4	90 HP TRACTOR	9908.89	4692.992	2463	2627	449	2912	1242	186	0	13047	652	1428	2080	4992	8.32	4.08	1.86	5.94
5	140 HP COMBINE	16207	9124.451	7335	7676	1011	8346	386	58	0	4106	274	444.26	718	9064	119.22	6.35	3.91	10.26

Implement Unit #	Description	Salvage Value P-C	Salvage Value ASAE	P-C Capital Recovery	ASAE Capital Recovery	Taxes, ins., shelter	Total overhead costs	Prior Repairs	Cum Repairs (life)	Repairs per year	Total Costs	Overhead Costs per Hr.	Repair Costs per Hr.	Total Costs per Hr.
1	12FT. CHISEL PLOW	2218.75	237.9345	277	339	66	343	0	973	49	391	8.57	1.22	9.7852
2	19 FT. TANDEM DISK	2709.89	581.9362	762	829	134	896	0	440	22	918	44.78	1.10	45.878
3	FLD. CULT., 26 FT.	NA	545.5294	NA	777	105	882	0	1573	79	960	27.55	2.46	30.006
4	GR. DRILL, 12 FT.	2044.69	260.6817	573	612	108	682	0	289	12	693	52.45	0.89	53.337
5	ALFALFA SEEDER, 12 FT.	1098.64	140.0678	308	329	58	366	0	90	4	370	36.63	0.36	36.993
6	PLANTER, 8 row narrow	6395.17	1737.236	1340	1564	238	1578	0	7712	514	2092	21.03	6.86	27.89
7	ROTARY HOE, 25 FT.	NA	220.7344	NA	314	42	357	0	106	5	362	35.67	0.53	36.201
8	CULTIVATOR, 8 row (36")	NA	1019.108	NA	918	111	**1029**	0	324	22	1050	**34.29**	0.72	35.011
9	CULTIVATOR, 13 skip-row (18")	NA	343.223	NA	309	37	346	0	24	2	348	23.10	0.11	23.203
10	SPRAYER, 66 FT.	NA	446.1899	NA	402	49	450	0	285	19	469	30.03	1.27	31.294
11	CORN HEAD, 8 row (36")	NA	1251.303	NA	1212	145	1357	0	538	36	1393	33.92	0.90	34.815
12	GR. PLAT., SB 20 FT.	NA	1116.267	NA	1081	129	1210	0	248	17	1227	40.34	0.55	40.894
13	HAUL GRAIN, 4 300 BU Wagons	NA	642.1365	NA	914	123	1038	0	4485	224	1262	12.97	2.80	15.773
14	SILAGE HARVESTER	NA	1064.519	NA	1031	123	1154	0	1566	104	1259	19.24	1.74	20.976
15	SILAGE HARV, platform (14')	NA	257.2588	NA	249	30	279	0	198	13	292	6.97	0.33	7.303
16	SILAGE HARV, 2 row	NA	524.2757	NA	508	61	568	0	133	9	577	28.42	0.44	28.865
17	HAUL SILAGE, 14 ft	NA	2178.146	NA	1962	237	2199	0	1667	111	2310	54.97	2.78	57.747
18	MOW. CONDIT., 14 FT.	NA	446.82	NA	683	91	774	0	2426	121	896	12.49	1.96	14.444
19	WINDROW INVERTER, 14 FT.	NA	192.0676	NA	274	37	310	0	68	3	314	31.04	0.34	31.378
20	SQ. BALER, 14 FT.	3307.9	879.2141	734	851	127	861	0	2242	149	1011	13.25	2.30	15.554
21	HAUL HAY, 15 FT.	NA	356.9018	NA	508	68	577	0	1903	95	672	8.87	1.46	10.336
22	GRAIN AUGER	NA	271.473	NA	204	22	227	0	11	1	227	22.65	0.09	22.739
23	FORAGE BLOWER, 14 FT.	NA	396.7306	NA	384	46	430	0	2102	140	570	4.30	1.40	5.7027
24	ANHYDROUS APPLICATOR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 14A.4 Costs of operating machine complements the Dairyman farm

Complement Unit #	Power Unit #	Implement Unit #	Implement Unit #	Repair Costs per Ac	Fuel& Lube Costs per Ac	Labor Costs per Ac	Operating Costs per Ac	Overhead Costs per Ac	Total Cost per Ac	Operation	Labor Type	Labor Code
1	2	24		0.2922	0.7199	1.2404	2.2525	$1.773	$4.025	Apply Anhydrous	H1	2
2	3	3		0.3452	0.3723	0.6414	1.3589	$2.195	$3.554	Field Cultivate Corn/Oats	H1	2
3	2	6		**1.1179**	**0.8055**	**1.3927**	3.3162	$4.411	$7.727	Plant corn/soy	O	1
4	4	7		0.0888	0.1543	0.4135	0.6565	$1.541	$2.197	Rotary Hoe	H1	2
5	3	8		**0.2712**	0.4000	**0.3951**	1.0663	**$2.745**	$3.811	Row Cultivate	H2	3
6	5	11		0.5674	0.7618	1.3126	2.6418	$18.013	$20.655	Combine Corn	H1	2
7	3	13		1.1362	1.1635	2.0047	4.3044	$4.431	$8.735	Haul Corn/Soy	H1	2
8	4	10		0.0981	0.1328	0.3571	0.5880	$1.159	$1.747	Spray	O	1
9	4	23		0.5752	0.7480	2.0047	3.3279	$2.242	$5.570	Blow Corn	H1	2
10	3	1		0.8460	1.1293	1.9457	3.9210	$3.588	$7.510	Chisel Plow	H1	2
11	4	4		0.5776	0.8816	2.3626	3.8218	$12.100	$15.922	Plant Set-aside	H1	2
12	4	18		0.5903	0.6612	1.0160	2.2674	$3.188	$5.455	Mow Set-aside	H2	3
13	2	3		0.2822	0.3723	0.6414	1.2960	$2.386	$3.682	Field Cultivate Soy	H1	2
14	2	9		0.2694	0.6400	0.6322	1.5415	$3.693	$5.235	Cultivate Soy	H2	3
15	5	12		0.9532	1.3713	2.3626	4.6871	$33.686	$38.373	Combine Soy	H1	2
16	4	4		0.5776	0.8816	2.3709	3.8302	$12.100	$15.930	Plant oats	O	1
17	4	5		0.4732	0.8816	2.3709	3.7257	$8.994	$12.719	Plant alfalfa	O	1
18	4	18		0.5903	0.6612	1.7720	3.0234	$3.188	$6.211	Cut Oats	H1	2
19	2	15	14	1.3758	1.9590	3.3752	6.7100	$12.179	$18.889	Chop Oats	H1	2
20	4	17		2.4144	2.2440	6.0140	10.6724	$32.060	$42.732	Haul Oatlage	H1	2
21	3	23		0.9025	1.1635	2.0047	4.0707	$2.986	$7.057	Blow Oatlage	H1	2
22	4	18		0.5903	0.6612	1.0160	2.2674	$3.188	$5.455	Cut Alfalfa	H2	3
23	4	20		0.8545	0.8816	2.3626	4.0987	$4.401	$8.500	Bale Hay	H1	2
24	2	21		1.0743	1.7453	1.7241	4.5437	$6.516	$11.060	Haul Hay	H2	3

Table 14A.5 Field Capacities of Various Machines

Description	Width	Speed	Efficiency	Acres per Hour	Notes
12FT. CHISEL PLOW	12	5	0.85	6.1818	15' Coulter Chisel
19 FT. TANDEM DISK	19	6	0.8	11.0545	19' Tandem
FLD. CULT., 26 FT.	26	7	0.85	18.7515	
GR. DRILL, 12 FT.	12	5	0.7	5.0909	
ALFALFA SEEDER, 12 FT.	12	5	0.7	5.0909	
PLANTER, 8 row narrow	20	5.5	0.65	8.6667	8-30"
ROTARY HOE, 25 FT.	25	12	0.8	29.0909	
CULTIVATOR, 8 row (36")	36	5	0.8	17.4545	8-36'
CULTIVATOR, 13 skip-row (18")	22.5	5	0.8	10.9091	12-30"
SPRAYER, 66 FT.	66	6.5	0.65	33.8000	
CORN HEAD, 8 row (36")	36	3	0.7	9.1636	8 Row
GR. PLAT., SB 20 FT.	20	3	0.7	5.0909	20' Grain Platform
HAUL GRAIN, 4 300 BU Wagons				6.0000	
SILAGE HARVESTER					Forage Chopper (Base unit)
SILAGE HARV, platform (14')	14	3	0.7	3.5636	Forage Chopper for Oatlage & Haylage
SILAGE HARV, 2 row	6	3	0.7	1.5273	Silage Harvesting Head for Corn
HAUL SILAGE, 14 ft				2.0000	
MOW. CONDIT., 14 FT.	14	5	0.8	6.7879	
WINDROW INVERTER	14	6	0.8	8.1455	Uses Data on Rake
SQ. BALER, 14 FT.	14	4	0.75	5.0909	Small Baler with Twine
HAUL HAY, 15 FT.				4.0000	
GRAIN AUGER 6"				5.3846	Grain Auger (700 Bu per hour)
FORAGE BLOWER, 14 FT.				6.0000	
ANHYDROUS APPICATOR	20	5	0.8	9.6970	

Table 14A.6 Example Calculations for Captial Recovery for Tractors and Machinery

	140 HP Tractor				140 HP Used Tractor				Row Cultivator			
Vo	53610.0000				33745.8588				9650.0000			
Vn	16286.2483				16367.5876				1019.1082			
Vo - Vn	37323.7517				17378.2712				8630.8918			
n	20				10				15			
Real interest rate	0.0500				0.0500				0.0500			
Inflation rate	0.0400				0.0400				0.0400			
Nominal interest rate	0.0920				0.0920				0.0920			
Vn/((1+r)^n)	6138.1157				10048.2789				490.2085			
V0-(Vn/((1+r)^n))	47471.8843				23697.5799				9159.7915			
US0(n,r)	12.46221				7.721734929				7.7217349			
Real annuity	3809.2668				3068.9450				882.4753			
Inflation adjusted annuity	3961.6375				3191.7028				917.7743			
End of Year	Actual	PV	Annuity	PV Annuity	Actual	PV	Annuity	PV Annuity	Actual	PV	Annuity	PV Annuity
0	53610.000	53610.000			33745.859	33745.859			9650.000	9650.000		
1	0.000	0.000	3961.64	3627.873156	0.000	0.000	3191.70	2922.80477	0.000	0.000	917.77	840.4526368
2	0.000	0.000	3961.64	3455.117292	0.000	0.000	3191.70	2783.62359	0.000	0.000	917.77	800.4310827
3		0.000	3961.64	3290.587897		0.000	3191.70	2651.07009		0.000	917.77	762.3153169
4		0.000	3961.64	3133.893235		0.000	3191.70	2524.82865		0.000	917.77	726.0145875
5		0.000	3961.64	2984.660224		0.000	3191.70	2404.59872		0.000	917.77	691.4424643
6		0.000	3961.64	2842.533547		0.000	3191.70	2290.09402		0.000	917.77	658.5166326
7		0.000	3961.64	2707.174806		0.000	3191.70	2181.04192		0.000	917.77	627.1586977
8		0.000	3961.64	2578.26172		0.000	3191.70	2077.18278		0.000	917.77	597.2939979
9		0.000	3961.64	2455.487353		0.000	3191.70	1978.26932		0.000	917.77	568.8514265
10		0.000	3961.64	2338.559384	-17022.291	-10048.279	3191.70	1884.06602		0.000	917.77	541.7632634
11		0.000	3961.64	2227.199413				0		0.000	917.77	515.9650127
12		0.000	3961.64	2121.142298				0		0.000	917.77	491.3952502
13		0.000	3961.64	2020.135522				0		0.000	917.77	467.9954764
14		0.000	3961.64	1923.938592				0		0.000	917.77	445.7099775
15		0.000	3961.64	1832.322469				0	-1059.873	-490.208	917.77	424.4856929
16		0.000	3961.64	1745.069018				0				
17		0.000	3961.64	1661.970493				0				
18		0.000	3961.64	1582.829041				0				
19		0.000	3961.64	1507.45623				0				
20	-16937.698	-6138.116	3961.64	1435.6726				0				
PV0		47471.884		47471.8843		23697.580		23697.580		9159.792		9159.792

Table 14A.7 Labor Use and Cost for Operations

Real interest rate	0.05
Inflation rate	0.04
Nominal interest arate	0.092
Monthly inflation rate	0.0032737

Acres of Corn	154
Acres of Soybean	102
Acres of Alfalfa Estab.	30
Acres of Alfalfa	83
Acres of Corn Silage	27
ARP	7.55

Labor costs based on 1991 allocations

Worker	Total Hours	Total Crop Hours	Corn Hours	Corn Per Acre Cost	Silage Hours	Silage Per Acre Cost	Oats-Alf Hours	Oats-Alf Per Acre Cost	Alfalfa Hours	Alfalfa Per Acre Cost	Soy Hours	Soybean Per Acre Cost	ARP Hours	ARP Per Acre Cost	Overhead Hours	Wages $/hour 1991	Wages $/hour 1992
Operator	3,550	1,113	154	9.88	27	9.88	30	9.88	80	9.52289	102	9.88	0	0	720	$9.50	9.880
Spouse	30		0	0	0	0	0	0	0	0	0	0	0	0	30		
Son	460	0	0	0	0	0	30	5.644889	100	6.80107	0	0	0	0	0	$5.43	5.645
Hired worker 1	2,550	1,956	191	12.2108	54	19.6907	30	9.845333	45	5.33783	52	5.01919	5	6.52009	0	$9.47	9.845
Hired worker 2	900	661	40	1.4662	14	2.92698	15	2.822444	45	3.06048	41	2.26902	11	8.22434	0	$5.43	5.645
Total Hired	3450	2617	231	13.677	68	22.6176	45	12.66778	90	8.39831	93	7.28821	16	14.7444	0		
Total cost per acre				**23.557**		**32.4976**		**28.19267**		**24.7223**		**17.1682**		**14.7444**			

Labor wages per month

Item	Real Price Year	Jan 1	Feb 2	Mar 3	Apr 4	May 5	Jun 6	July 7	Aug 8	Sep 9	Oct 10	Nov 11	Dec 12	Average	Last year nominal	Current nominal
Operator labor real	**10.058570**	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	10.0586	9.5000	9.8800
Operator labor nominal		9.7034	9.7351	9.7670	9.7990	9.8311	9.8632	**9.8955**	9.9279	9.9604	9.9930	10.0257	10.0586	9.8800	9.5000	9.8800
Hired labor 1 real	**10.023277**	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	10.0233	9.4667	9.8453
Hired labor 1 nominal		9.6693	9.7010	9.7327	9.7646	9.7966	9.8286	9.8608	9.8931	9.9255	9.9580	9.9906	10.0233	9.8453	9.4667	9.8453
Hired labor 2 real	**5.746914**	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.7469	5.4278	5.6449
Hired labor 2 nominal		5.5440	5.5621	5.5803	5.5986	5.6169	5.6353	5.6538	5.6723	5.6908	5.7095	5.7282	5.7469	5.6449	5.4278	5.6449

Table 14A.8 Insurance and overhead costs for corn production

Acres of Corn	154
Acres of Soybean	102
Acres of Alfalfa Establishment	30
Alfalfa	83
Corn Silage	27
ARP	7.55
Annual inflation rate	0.04

Overhead expenses	Total 1991	Total 1992	Corn %	Corn Total	Corn Per Acre	Soybean %	Soybean Total	Soybean Per Acre	Alf-Oats %	Alf-Oats Total	Alf-Oats Per Acre
Office	1194	1241.76	0.11	136.59	0.89	0.08	99.34	0.97	0.01	12.42	0.41
Fuel, Lube and Utilities	3500	3640	0.11	400.40	2.60	0.08	291.20	2.85	0.01	36.40	1.21
Bldg Repairs	7165	7451.6	0.11	819.68	5.32	0.08	596.13	5.84	0.01	74.52	2.48
Machinery Repairs	1235	1284.4	0.11	141.28	0.92	0.08	102.75	1.01	0.01	12.84	0.43
Total Overhead	13094	13617.76		1497.954	9.73		1089.42	10.68		136.178	4.54
Insurance	880	915.2	0.11	100.67	0.65	0.08	73.22	0.72	0.01	9.15	0.31

Table 14A.9 Machine and labor costs for soybean production

Real Interest rate 0.05
Inflation rate 0.04
Nominal Interest Rate 0.092

Operation Description	Field Cultivate	Plant Soybean	Rotary Hoe	Apply Herbicide	Row Cultivate	Combine Soybean	Haul Soybean	Total All Operations
Complement #	13	3	4	8	5	15	7	
Complement Description	Field Cultivate Soy	Plant corn/soy	Rotary Hoe	Spray	Row Cultivate	Combine Soy	Haul Corn/Soy	
Month of Operation	5	5	5	6	6	10	10	
Field Rate Data								
'Acres Per Hour	18.75152	8.66667	29.09091	33.80000	17.45455	5.09091	6.00000	
'Hours Per Acre	0.05333	0.11538	0.03438	0.02959	0.05729	0.19643	0.16667	0.65306
Times Over	1	1	0.3	1	1	1	1	
Fuel & Lube Cost per Acre (Beg Year Prices)	0.37230	0.80553	0.04628	0.13278	0.39997	1.37132	1.16355	4.29174
Repair Cost per Acre (End of Year Prices)	0.28221	1.11790	0.02663	0.09814	**0.27121**	0.95319	1.13618	**3.88547**
Total Labor Hours Per Acre	0.06399	0.13846	0.01238	0.03550	0.06875	0.23571	0.20000	**0.75480**
Operator Labor Hours Per Acre	0.00000	0.13846	0.00000	0.03550	0.00000	0.00000	0.00000	0.17396
Hired 1 Labor Hours Per Acre	0.06399	0.00000	0.01238	0.00000	0.00000	0.23571	0.20000	0.51208
Hired 2 Labor Hours Per Acre	0.00000	0.00000	0.00000	0.00000	0.06875	0.00000	0.00000	0.06875
Total Labor Cost per Acre (Real End Year Prices)	0.64144	1.39273	0.12404	0.35711	0.39510	2.36263	2.00466	7.27770
Operator Labor Cost per Acre (Real End Year Prices)				0.35711				0.35711
Hired 1 Labor Cost per Acre (Real End Year Prices)	0.64144	1.39273	0.12404			2.36263	2.00466	6.52549
Hired 2 Labor Cost per Acre (Real End Year Prices)					**0.39510**			0.39510
Fuel & Lube Cost per Acre (Current Month Prices)	0.37844	0.81880	0.04704	0.13541	**0.40789**	1.41688	1.20220	**4.40668**
Total Labor Cost per Acre (Current Month Prices)	0.62693	1.36122	0.12123	0.35017	0.38743	2.34724	1.99159	7.18582
Operator Labor Cost per Acre (Current Month Prices)	0.00000	1.36122	0.00000	0.35017	0.00000	0.00000	0.00000	1.71140
Hired 1 Labor Cost per Acre (Current Month Prices)	0.62693	0.00000	0.12123	0.00000	0.00000	2.34724	1.99159	5.08699
Hired 2 Labor Cost per Acre (Current Month Prices)	0.00000	0.00000	0.00000	0.00000	**0.38743**	0.00000	0.00000	0.38743
Operating Costs per Acre (Stated Prices)	1.29596	3.31616	0.19695	0.58803	1.06628	4.68714	4.30439	15.45490
Operating Costs per Acre (Current Month Except Repairs)	1.28758	3.29793	0.19491	0.58372	1.06653	4.71731	4.32998	15.47796
Operating Interest on Fuel & Lube (Current Month Prices)	0.01994	0.04313	0.00248	0.00609	**0.01835**	0.02094	0.01776	**0.12869**
Operating Interest on Repairs (End of Year Prices)	0.01487	0.05889	0.00140	0.00441	**0.01220**	0.01408	0.01679	**0.12265**
Operating Interest on Labor (Current Month Prices)	0.03303	0.07171	0.00639	0.01575	0.01743	0.03468	0.02943	**0.20842**
Overhead Costs per Acre (End of Year)	2.38588	4.41069	0.46221	1.15914	**2.74456**	33.68565	4.43071	**49.27883**
Total Cost per Acre (Stated Prices)	3.68184	7.72684	0.65916	1.74716	3.81084	38.37279	8.73509	64.73373
Total Cost per Acre (Adjusted Prices)	3.67346	7.70861	0.65712	1.74286	3.81109	38.40295	8.76069	**64.75679**
Total Operating Interest on Above	0.06783	0.17374	0.01027	0.02626	0.04798	0.06971	0.06398	**0.45976**
Total Costs including Interest	3.74129	7.88235	0.66739	1.76912	3.85907	38.47266	8.82467	**65.21655**

Stated prices are beginning of year prices for fuel, lube and labor and end of year prices for repairs and overhead

Adjusted prices are in current months for fuel, lube and labor and end of the year for repairs and overhead

Table 14A.10 Machine and labor costs for alfalfa establishment after corn

Real Interest rate	0.05
Inflation rate	0.04
Nominal Interest Rate	0.092

Operation Description	Field Cultivate	Plant Oats	Plant Alfalfa	Cut Oats	Chop Oats
Complement #	2	16	17	18	19
Complement Description	Field Cultivate Corn/Oats	Plant oats	Plant alfalfa	Cut Oats	Chop Oats
Month of Operation	4	4	4	5	5
Field Rate Data					
'Acres Per Hour	18.75152	5.09091	5.09091	6.78788	3.56364
'Hours Per Acre	0.05333	0.19643	0.19643	0.14732	0.28061
Times Over	1	1	1	1	1
Fuel & Lube Cost per Acre (Beg Year Prices)	0.37230	0.88156	0.88156	0.66117	1.95903
Repair Cost per Acre (End of Year Prices)	0.34517	0.57765	0.47315	0.59025	1.37580
Total Labor Hours Per Acre	0.06399	0.23571	0.23571	0.17679	0.33673
Operator Labor Hours Per Acre	0.00000	0.23571	0.23571	0.00000	0.00000
Hired 1 Labor Hours Per Acre	0.06399	0.00000	0.00000	0.17679	0.33673
Hired 2 Labor Hours Per Acre	0.00000	0.00000	0.00000	0.00000	0.00000
Total Labor Cost per Acre (Real End Year Prices)	0.64144	2.37095	2.37095	1.77197	3.37519
Operator Labor Cost per Acre (Real End Year Prices)			2.37095	1.77197	
Hired 1 Labor Cost per Acre (Real End Year Prices)	0.64144	2.37095			3.37519
Hired 2 Labor Cost per Acre (Real End Year Prices)					
Fuel & Lube Cost per Acre (Current Month Prices)	0.37720	0.89317	0.89317	0.67207	1.99131
Total Labor Cost per Acre (Current Month Prices)	0.62488	2.30976	2.30976	1.73189	3.29884
Operator Labor Cost per Acre (Current Month Prices)	0.00000	2.30976	2.30976	0.00000	0.00000
Hired 1 Labor Cost per Acre (Current Month Prices)	0.62488	0.00000	0.00000	1.73189	3.29884
Hired 2 Labor Cost per Acre (Current Month Prices)	0.00000	0.00000	0.00000	0.00000	0.00000
Operating Costs per Acre (Stated Prices)	1.35892	3.83016	3.72567	3.02340	6.71001
Operating Costs per Acre (Current Month Except Repairs)	1.34726	3.78057	3.67608	2.99421	6.66595
Operating Interest on Fuel & Lube (Current Month Prices)	0.02279	0.05397	0.05397	0.03540	0.10490
Operating Interest on Repairs (End of Year Prices)	0.02086	0.03491	0.02859	0.03109	0.07248
Operating Interest on Labor (Current Month Prices)	0.03776	0.13958	0.13958	0.09124	0.17378
Overhead Costs per Acre (End of Year)	2.19510	12.09971	8.99373	3.18804	12.17896
Total Cost per Acre (Stated Prices)	3.55401	15.92987	12.71940	6.21144	18.88897
Total Cost per Acre (Adjusted Prices)	3.54236	15.88028	12.66981	6.18225	18.84491
Total Operating Interest on Above	0.08141	0.22846	0.22214	0.15774	0.35116
Total Costs including Interest	3.62377	16.10874	12.89195	6.33999	19.19607

Table 14A.10 Machine and labor costs for alfalfa establishment after corn (continued)

Operation Description	Blow Oatlage	Cut Alfalfa	Bale Hay	Haul Bales	Total All Operations
Complement #	21	22	23	24	
Complement Description	Blow Oatlage	Cut Alfalfa	Bale Hay	Haul Hay	
Month of Operation	5	8	8	8	
Field Rate Data					
'Acres Per Hour	6.00000	6.78788	5.09091	4.00000	
'Hours Per Acre	0.16667	0.14732	0.19643	0.25000	
Times Over	1	1	1	1	
Fuel & Lube Cost per Acre (Beg Year Prices)	1.16355	0.66117	0.88156	1.74532	11.45123
Repair Cost per Acre (End of Year Prices)	0.90253	0.59025	0.85451	1.07433	9.19808
Total Labor Hours Per Acre	0.20000	0.17679	0.23571	0.30000	2.56144
Operator Labor Hours Per Acre	0.00000	0.00000	0.00000	0.00000	0.47143
Hired 1 Labor Hours Per Acre	0.20000	0.00000	0.23571	0.00000	1.61323
Hired 2 Labor Hours Per Acre	0.00000	0.17679	0.00000	0.30000	0.47679
Total Labor Cost per Acre (Real End Year Prices)	2.00466	1.01597	2.36263	1.72407	23.65179
Operator Labor Cost per Acre (Real End Year Prices)			2.36263		6.50555
Hired 1 Labor Cost per Acre (Real End Year Prices)	2.00466	1.01597		1.72407	11.13227
Hired 2 Labor Cost per Acre (Real End Year Prices)					6.01397
Fuel & Lube Cost per Acre (Current Month Prices)	1.18272	0.67869	0.90492	1.79156	11.66575
Total Labor Cost per Acre (Current Month Prices)	1.95931	1.00278	2.33194	1.70168	23.14878
Operator Labor Cost per Acre (Current Month Prices)	0.00000	0.00000	0.00000	0.00000	4.61952
Hired 1 Labor Cost per Acre (Current Month Prices)	1.95931	0.00000	2.33194	0.00000	15.82481
Hired 2 Labor Cost per Acre (Current Month Prices)	0.00000	1.00278	0.00000	1.70168	2.70446
Operating Costs per Acre (Stated Prices)	4.07074	2.26740	4.09870	4.54372	44.30110
Operating Costs per Acre (Current Month Except Repairs)	4.04456	2.27172	4.09137	4.56757	44.01262
Operating Interest on Fuel & Lube (Current Month Prices)	0.06231	0.02021	0.02694	0.05334	0.55400
Operating Interest on Repairs (End of Year Prices)	0.04755	0.01757	0.02544	0.03198	0.43767
Operating Interest on Labor (Current Month Prices)	0.10322	0.02985	0.06943	0.05066	1.14475
Overhead Costs per Acre (End of Year)	2.98591	3.18804	4.40111	6.51599	87.80652
Total Cost per Acre (Stated Prices)	7.05664	5.45544	8.49981	11.05971	132.10762
Total Cost per Acre (Adjusted Prices)	7.03047	5.45976	8.49248	11.08355	131.81914
Total Operating Interest on Above	0.21307	0.06763	0.12181	0.13598	2.13641
Total Costs including Interest	7.24354	5.52739	8.61429	11.21954	133.95555

Stated prices are beginning of year prices for fuel, lube and labor and end of year prices for repairs and overhead

Adjusted prices are in current months for fuel, lube and labor and end of the year for repairs and overhead